*Systems Applications International, LLC*

Arkansas Department of Environmental Quality

# Ozone Modeling for the Crittenden County Economic Development Zone (EDZ)

Final Report

**4 January 2006**

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Arkansas Department of
Environmental Quality

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## Final Report

**4 January 2006**

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# 1. Introduction and Background

This document describes an ozone air quality modeling study for Crittenden County, Arkansas, which is part of the Memphis Metropolitan Statistical Area (MSA). The objectives of this modeling were to simulate and assess potential future-year ozone air quality impacts from hypothetical industrial facilities that may be located in the proposed Crittenden County Economic Development Zone (EDZ). An application for EDZ designation is being prepared in a joint effort by the State of Arkansas, Crittenden County, and the municipalities of Marion and West Memphis. The air quality modeling analysis summarized herein is a part of the formal package that is required for an EDZ designation request.

Crittenden County, which lies adjacent to the Mississippi River and just west of Memphis, Tennessee, is mostly a rural county with small communities and little industry. The Memphis MSA, which has a population of just over 1.2 million, also includes Shelby, Tipton, and Fayette Counties, Tennessee and DeSoto County, Mississippi. In 2001, Crittenden County reported a population of just over 51,000, while Shelby County (which includes the City of Memphis) reported a population of 896,000. Fayette County had a population of 31,000, while Tipton County had a population of 53,000. DeSoto County, Mississippi, which is also quite rural and serves as a bedroom community for Memphis, had a population of 114,000. Marshall, Tate and Tunica counties in Mississippi were added to the MSA as a result of the findings of the federal Census Bureau's 2000 Census. In 2001, their populations were reported as 35,000, 25,000, and 9000, respectively. Interstate 40 runs east-west through Crittenden County, while Interstate 55 runs north from the center of the county adjacent to the City of Memphis. With its central U.S. location, and proximity to major transportation/shipping facilities (highway, railway, Mississippi River), Crittenden County is well suited for the development of various manufacturing and supporting industries.

Within the Memphis MSA, ground-level ozone is measured at the Crittenden County (Marion) monitor, which is located 10 miles northwest of downtown Memphis in Marion, Arkansas; at two monitors in Shelby County (Frayser Street and Edmund Orgill Park); and at one monitor located in the central part of DeSoto County (Hernando). In recent years, the Marion monitor has measured some of the highest 1- and 8-hour average ozone concentrations in the Memphis MSA. For example, the 8-hour design values for 2002, 2003, and 2004 at the Marion monitor are 94, 92, and 87 ppb, respectively. Corresponding design values for the Shelby County monitors are 90, 89, and 84 ppb at the Edmund Orgill Park monitor, and 87, 84, and 80 ppb at the Frayser Street monitor. The 8-hour design values at the DeSoto County monitor are 86, 81, and 83 ppb. While the 8-hour design values at the Shelby and DeSoto County monitors are lower and show a distinct downward trend in recent years, the Marion monitor shows the highest design values and less of a trend.

On the basis of ozone measurements taken at the Marion, AR monitor and the new 8-hour ozone standard, in June 2004 Crittenden County (along with Shelby County) was designated by EPA as a *moderate* ozone nonattainment area. Subsequent to the designation, a petition was filed with EPA on behalf of Crittenden and Shelby Counties with a request to be re-designated as a *marginal* ozone nonattainment area, and in August 2004 the request was granted. The *marginal* ozone nonattainment area status for these counties potentially limits new growth in industrial facilities within the area. While Crittenden County is part of the Memphis ozone nonattainment area, the designation as an EDZ would allow for siting of new emissions sources within the county as long as the emissions from those sources do not impede progress towards future attainment of the 8-hour ozone standard for the Memphis nonattainment area.

This modeling analysis included the simulation of a hypothetical industrial source complex situated in various areas of the county and an assessment of ozone air quality impacts within the county and MSA. For this analysis, air quality modeling databases prepared as part of the Arkansas-Tennessee-Mississippi Ozone Study (ATMOS) Early Action Compact (EAC) (Douglas, et al., 2004a, b) and Little Rock Ozone Flex (Douglas et al., 2004c) ozone modeling analyses were utilized. In many of the subsequent sections of this report, the reader is referred to these documents for a more complete summary and discussion of certain aspects of the modeling.

Section 2 of this document presents an overview of the modeling databases utilized in this analysis and Section 3 describes the future-year modeling analysis. Section 4 presents the EDZ impact analysis. Finally, Section 5 provides a summary and description of the findings and conclusions of the analysis.

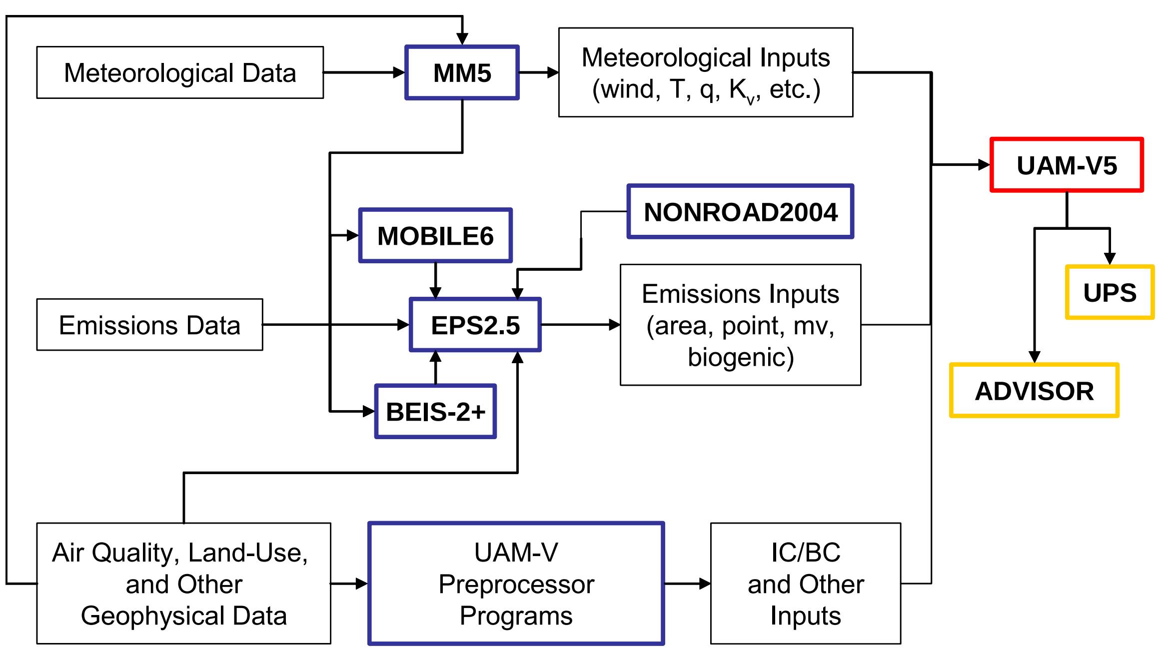
# 2. Overview of Modeling Databases

This section presents an overview of the photochemical modeling system, modeling domain, episodes simulated, and meteorological modeling and emission inventory preparation procedures followed in conducting the Crittenden County EDZ modeling analysis. As noted above, the modeling databases developed for the ATMOS EAC regional ozone modeling analysis and the Little Rock Ozone Flex modeling analysis were applied in the EDZ assessment for Crittenden County. For a full summary of the tools and procedures, the reader is referred to Douglas et al., (2004a, b, and c).

## 2.1. Overview of Photochemical Modeling System

The Crittenden County EDZ modeling analysis utilized much of what was established for the original ATMOS and Little Rock analyses in terms of modeling tools and modeling domain specifications. The primary modeling tools used in this study include: the variable-grid Urban Airshed Model (UAM-V) Version 1.5, a regional- and urban-scale, nested-grid photochemical model; the Emission Preprocessor System (EPS2.5), for preparation of model-ready emission inventories; the Biogenic Emission Inventory System with high-resolution land-use and crop data (BEIS-2+), for estimating biogenic emissions; the MOBILE6 model, for estimating motor-vehicle emissions; EPA's NONROAD2004 model, which calculates non-road emissions; and the Pennsylvania State University/National Center for Atmospheric Research (PSU/NCAR) Mesoscale Model, Version 5 (MM5), for preparation of the meteorological inputs. The UAM-V modeling system outputs were summarized and displayed using the UAM-V Postprocessing System (UPS) and a project-specific ACCESS Database for Visualizing and Investigating Strategies for Ozone Reduction (ADVISOR). Figure 2-1 provides an overview of the modeling system, including key input data requirements, UAM-V input files, and interactions among the modeling system components.

**Figure 2-1.**
**Schematic Diagram of the ATMOS EAC Photochemical Modeling System as Used in the Crittenden County EDZ Modeling Analysis**



## 2.2. Overview of the UAM-V5 Modeling System

The variable-grid Urban Airshed Model (UAM-V) is a three-dimensional photochemical grid model that calculates concentrations of pollutants by simulating the physical and chemical processes in the atmosphere. The basis for the UAM-V is the atmospheric diffusion or species continuity equation. This equation represents a mass balance that includes all of the relevant emissions, transport, diffusion, chemical reactions, and removal processes in mathematical terms.

The major factors that affect photochemical air quality include:

- The pattern of emissions of oxides of nitrogen ($NO_x$) and volatile organic compounds (VOC), both natural and anthropogenic.
- Composition of the emitted VOC and $NO_x$.
- Spatial and temporal variations in the wind fields.
- Dynamics of the boundary layer, including stability and the level of mixing.
- Chemical reactions involving VOC, $NO_x$, and other important species.
- Diurnal variations of solar insolation and temperature.
- Loss of ozone and ozone precursors by dry and wet deposition.
- Ambient background of VOC, $NO_x$, and other species in, immediately upwind of, and above the study region.

The UAM-V simulates all of these processes. The species continuity equation is solved using the following fractional steps: emissions are injected; horizontal advection/diffusion are solved; vertical advection/diffusion and deposition are solved; and chemical transformations are performed for reactive pollutants. The UAM-V performs these four calculations during each time step. The maximum time step is a function of the grid size, maximum wind velocity, and diffusion coefficient. The typical time step is 10–15 minutes for coarse (10–20 km) grids and a few minutes for fine (1–2 km) grids.

Because it accounts for spatial and temporal variations as well as differences in the reactivity of emissions, the UAM-V is ideal for evaluating the air-quality effects of emission control scenarios. This is achieved by first replicating a historical ozone episode to establish a base-case simulation. Model inputs are prepared from observed meteorological, emissions, and air quality data for the episode days using dynamic meteorological modeling and/or diagnostic and interpolative techniques. The model is then applied with these inputs, and the results are evaluated to assess model performance. Once the model results have been evaluated and determined to perform within prescribed levels, the same base-case meteorological inputs are combined with *modified* or *projected* emission inventories to simulate possible alternative/future emission scenarios.

The UAM-V modeling system (Version 1.5) incorporates the latest version of the Carbon-Bond chemical mechanism, known as Carbon Bond 5 (CB-V), with enhanced isoprene chemistry (SAI, 2002). Features of the UAM-V modeling system include:

- **Variable vertical grid structure:** The structure of vertical layers can be arbitrarily defined. This allows for higher resolution near the surface and facilitates matching with output from prognostic meteorological models.

- **Three-dimensional meteorological inputs:** The meteorological inputs for UAM-V vary spatially and temporally. These are usually calculated using a prognostic meteorological model.
- **Variable grid resolution for chemical kinetic calculations:** A chemical aggregation scheme can be employed, allowing chemistry calculations to be performed on a variable grid while advection/diffusion and emissions injections are performed on a fixed grid.
- **Two-way nested grid:** Finer grids can be imbedded in coarser grids for more detailed representation of advection/diffusion, chemistry, and emissions. Several levels of nesting can be accommodated.
- **Updated chemical mechanism:** The original Carbon Bond IV chemical mechanism has been updated to include many additional reactions. The updated chemical mechanism (CB-V) also supports the enhanced treatment of isoprene and hydrocarbon species.
- **Dry deposition algorithm:** The dry deposition algorithm is similar to that used by the Regional Acid Deposition Model (RADM).
- **True mass balance:** Concentrations are advected and diffused in the model using units of mass per unit volume rather than parts per million. This maintains true mass balance in the advection and diffusion calculations.
- **Plume-in-grid treatment:** Emissions from point sources can be treated by a subgrid-scale Lagrangian photochemical plume model. Pollutant mass is released from the subgrid-scale model to the grid model when the plume size is commensurate with grid cell size.
- **Plume rise algorithm:** The plume rise algorithm is based on the plume rise treatment for a Gaussian dispersion model.
- **OPTM method for ozone apportionment estimates:** The Ozone and Precursor Tagging Methodology (OPTM) approach allows the user to estimate contributions to ozone formation from various source categories or regions. The method tags oxidant formed during the chemistry step and attributes it to the $NO_x$ and VOC participating in the chemistry during that step. At the end of a run the user can analyze the results based on the accumulated effects to help determine the most effective control strategies for ozone reduction.

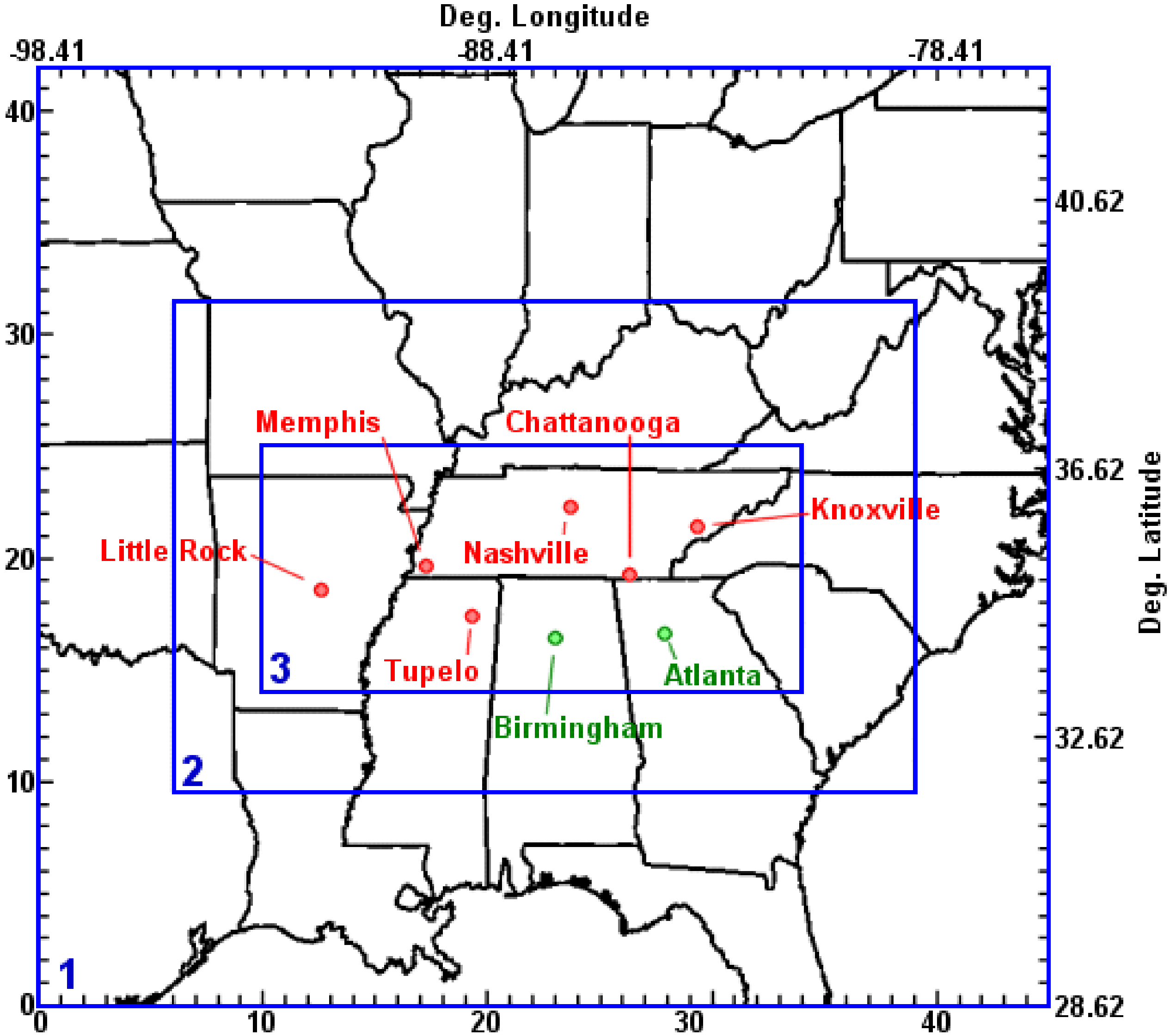
## 2.3. Modeling Domain

The modeling domain for application of the UAM-V5 for the Crittenden County EDZ analysis, as used for the ATMOS EAC modeling, was designed to accommodate both regional and subregional influences as well as to provide a detailed representation of the emissions, meteorological fields, and ozone (and precursor) concentration patterns over the area of interest. The UAM-V5 modeling domain is presented in Figure 2-2 and includes a 36-km resolution outer grid encompassing the southeastern U.S.; a 12-km resolution intermediate grid; and a 4-km resolution inner grid encompassing Tennessee and portions of Mississippi, Arkansas, and other neighboring states.

The regional extent of the modeling domain is intended to provide realistic boundary conditions for the primary areas of interest and thus avoid some of the uncertainty introduced in the modeling results through the incomplete and sometimes arbitrary specification of boundary conditions. The use of 4-km grid resolution over the primary area of interest is consistent with an urban-scale analysis of each of the areas of interest.

The UAM-V5 domain is further defined by eleven vertical layers with layer interfaces at 50, 100, 200, 350, 500, 750, 1000, 1250, 1750, 2500, and 3500 meters (m) above ground level (agl).

**Figure 2-2.**
**UAM-V5 Modeling Domain for the ATMOS Study and the Crittenden County EDZ Modeling Analysis**




Grid 1: (-98.41,28.62)—45x42—36-km Cells
Grid 2: (-95.41,31.79)—99X66—12-Km Cells
Grid 3: (-93.41,33.96)—215x81—4-km Cells

## 2.4. Episode Selection

For the Crittenden County EDZ analysis, modeling episodes selected and modeled as part of the ATMOS EAC analysis were utilized. A complete description of the ATMOS episode selection is provided in the original ATMOS EAC TSD (Douglas et al., 2004a). The following is a brief summary of the episode selection process.

Episode selection for the ATMOS EAC modeling/analysis was based on a review of historical meteorological and air quality data with emphasis on representing typical ozone exceedance events in the areas of interest. The episode selection was conducted in stages. First, in 2000, a primary multi-day simulation period was selected for the ATMOS modeling. This period was selected to optimize the representation of typical 8-hour ozone exceedance conditions and concentration levels for all of the areas of interest (which, for ATMOS, included all of the EAC areas with the exception of the Tri-Cities EAC area). A second multi-day simulation period was added in 2003, to enhance the robustness of the EAC modeling by including additional days and types of exceedance conditions. This episode was specifically selected to complement the first ATMOS simulation period in terms of representing different key meteorological conditions and providing additional exceedance days for certain areas, including the Memphis area. Finally, a third multi-day simulation period was added in 2004, as modeling databases from the State of Arkansas became available for use in the ATMOS study. This third simulation period includes additional exceedance days for all of the areas of interest (again including the Memphis area) and some variation on the exceedance meteorological conditions.

Overall, the primary objective of the episode selection was to identify and assemble suitable periods for analysis and modeling related to the 8-hour ozone NAAQS for the ATMOS EAC areas of interest. Important considerations in selecting (and adding to) the episodes include (1) representing the range of meteorological conditions that accompany ozone exceedances, (2) representing the ozone concentration levels that characterize the nonattainment problem, and (3) accounting for the frequency of occurrence of the exceedance meteorological regimes.

The three episodes selected for this study each include two start-up days and one clean out day. The length of each episode was designed to capture the entire high ozone cycle for each area of interest as influence by the synoptic and mesoscale meteorological conditions. The episodes also include both weekdays and weekend days. The three selected episodes include:

- 29 August–9 September 1999, Sunday–Thursday.
- 16–22 June 2001, Saturday–Friday.
- 4–10 July 2002, Thursday–Wednesday.

For the Greater Memphis area, the three modeling episodes include 10 exceedance days and represent two of the three key exceedance meteorological regimes (conditions associated with ozone exceedances) as well as several other high ozone regimes for Memphis.

The episodes also include:

- Nine exceedance days with maximum 8-hour ozone concentrations within 10 ppb of the 2000-2002 design value.
- Four additional near-exceedance days.
- A range of 8-hour ozone exceedance concentrations from 86 to 106 ppb.
- An average 8-hour ozone exceedance concentration of 94 ppb.

## 2.5. Meteorological Modeling

Meteorological inputs were prepared for the ATMOS UAM-V5 application using the Fifth Generation Pennsylvania State University/National Center for Atmospheric Research (PSU/NCAR) Mesoscale Model (MM5). Key features of the MM5 modeling system that are relevant to its use in this study include multiple nested-grid capabilities, incorporation of observed meteorological data using a four-dimensional data-assimilation technique, and a detailed treatment of the planetary boundary layer.

MM5 was applied for each simulation period and the results were evaluated using graphical and statistical analysis. Comparison with the observed data was used to examine the model's ability to represent key meteorological features such as the wind speeds and directions and site-specific temperatures. In summary, the MM5 results for the three modeling episode periods represent the regional-scale airflow patterns and the temperature and moisture characteristics of the episodes. Wind speeds (especially under light wind conditions) tend to be overestimated, and the MM5-derived vertical mixing profiles, while realistic, do not always agree with observation-based mixing height estimates.

In the Crittenden County EDZ modeling analysis, no updates were made to the meteorological inputs from those used in the ATMOS analysis. The reader is referred to the original ATMOS EAC TSD for a complete summary of this information.

## 2.6. Emission Inventory Preparation

For the Crittenden County EDZ modeling, the base case and current year (2001) emission inventories prepared as part of the ATMOS EAC modeling were not used. For the EDZ modeling analysis, emission inventories for a new current year (2002) were developed. However, many of the same procedures were followed. The reader is referred to the original ATMOS EAC TSD and Addendum for a complete summary of the procedures followed in preparing the base-case emissions and original current year (2001) inventories. The differences between the current-year emissions used for the ATMOS EAC and EDZ modeling exercises are summarized in Appendix A.

In the course of conducting the EDZ modeling analysis, updated emission estimates for 2002 prepared by each of the states became available. These estimates were prepared for inclusion in the 2002 version of the National Emission Inventory (NEI) and were also provided to the Visibility Improvements-State and Tribal Association of the Southeast (VISTAS) for the regional haze modeling analysis. To take advantage of these updated estimates, new current-year emissions were developed for each of the modeling episodes. The general processing tools used and procedures followed in preparing the 2002 current year emission inventories are the same as those used in the ATMOS EAC modeling exercise. A summary of the emissions prepared for 2002 for the VISTAS region is provided in Stella and Brewer (2004).

As presented in Figure 2-1, the emissions were developed using MOBILE6.2.03, NONROAD2004, and BEIS-2. The model-ready emissions were processed using the EPS2.5 emissions processor. An overview of the preparation of the 2002 inventory by component is provided in the following:

### 2.6.1. Area Source

Emissions were prepared based on the VISTAS revised 2002 Phase II data including the typical year area level fires.

### 2.6.2. Non-Road

Emissions for Aircraft, Railroad and Commercial Marine Vessels were prepared based on the VISTAS revised 2002 Phase II data. Errors were corrected for commercial marine vessels for Avoyelles parish, LA (used NET96V3 values for the category) that were also found in the NEI-99 version 2 data. For all other non-road source categories, we used the EPA draft NONROAD2004 model with monthly maximum, minimum and average temperatures (calculated from the 1971-2000 30-year historical averages).

### 2.6.3. On-Road Mobile

Emissions for mobile sources were prepared using MOBILE6.2.03 with the following input data:

- State provided 2002 VMT data, monthly max/min temperatures and absolute humidity for AL, AR, LA, MS, TN and TX
- VISTAS revised 2002 Phase II VMT data, monthly max/min temperatures and absolute humidity for FL, GA, NC and SC
- VISTAS revised 2002 Phase II VMT data, seasonal max/min temperatures and absolute humidity for other states

### 2.6.4. Point Source

Emissions were prepared based on the state provided point source data, the VISTAS revised 2002 Phase II typical year data, and data provided by Southern Company for their sources. The details are as follows:

- **State-provided Data**
  - 2002 annual emissions for AL (except Jefferson County), AR, FL, GA, MS and LA
- **VISTAS 2002 Data**
  - 2002 annual emissions for the other states and Jefferson County, AL
  - Day-specific fires emissions treated as point sources for the states of AL, FL, GA, KY, NC, SC, TN, VA and WV
  - CEM-based hourly-specific emissions for TVA and Entergy facilities
- **Southern Company 2002 Data**
  - Episode-specific emissions for each episode day or with day of week match

### 2.6.5. Biogenic

In estimating the biogenic emissions, we used BELD3 1-km resolution land use data with BEIS-2 and hourly gridded temperature and radiation data generated by MM5. This methodology is referred to as BEIS-2+ because it utilizes the high-resolution land use data that was recently made available for the application of BEIS-3.

The 2002 base case emission totals for Crittenden and Shelby County are presented and compared with the future year totals in the next section.

## 2.7. Model Performance Evaluation

In the Crittenden County EDZ modeling analysis, no updates were made to the base-case inputs for the three modeling episodes from those used in the ATMOS analysis. The reader is referred to the original ATMOS EAC TSD for a complete summary of the UAM-V5 model performance evaluation for these episodes. As an example of base-case model performance for the three episodes for the Memphis area, Figures 2-3, 2-4, and 2-5 present time-series plots of observed vs. simulated ozone concentrations for the Memphis area monitors for the August-September 1999, June 2001, and July 2002 episodes, respectively. In these plots, the boxes represent the observed values, the solid line represents the simulated values (interpolated to the monitoring site location), and the shaded areas represent the range of concentrations in the nine cells surrounding the grid cell in which the monitoring site is located. Plots for all days span two pages. Note that the Frayser monitoring site is labeled as Memphis in these plots.

**Figure 2-3a.**
**1999 Episode Time Series: Memphis EAC Area, August 29 to September 3, 1999**

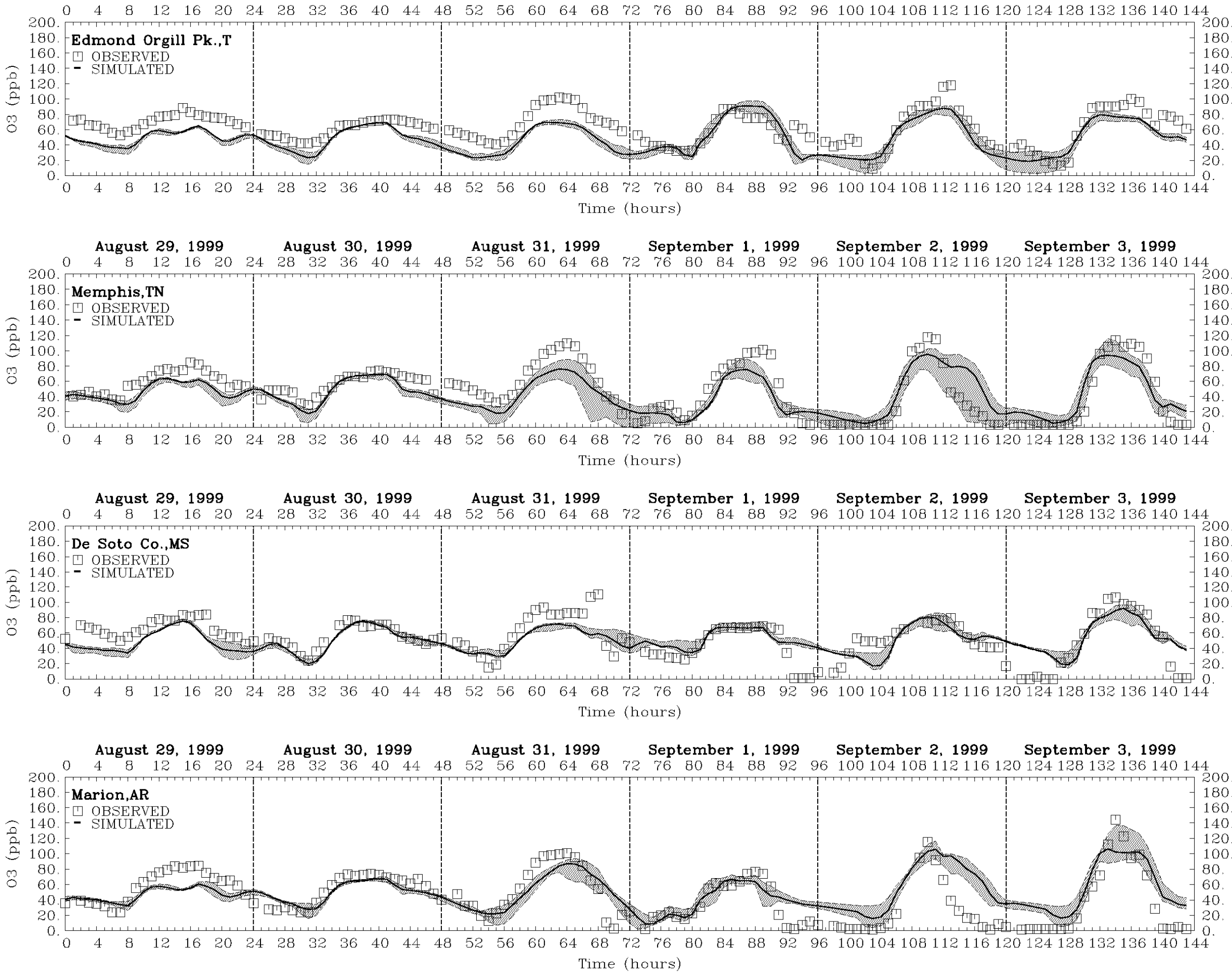


**Figure 2-3b.**
**1999 Episode Time Series: Memphis EAC Area,**
**September 4-9, 1999**

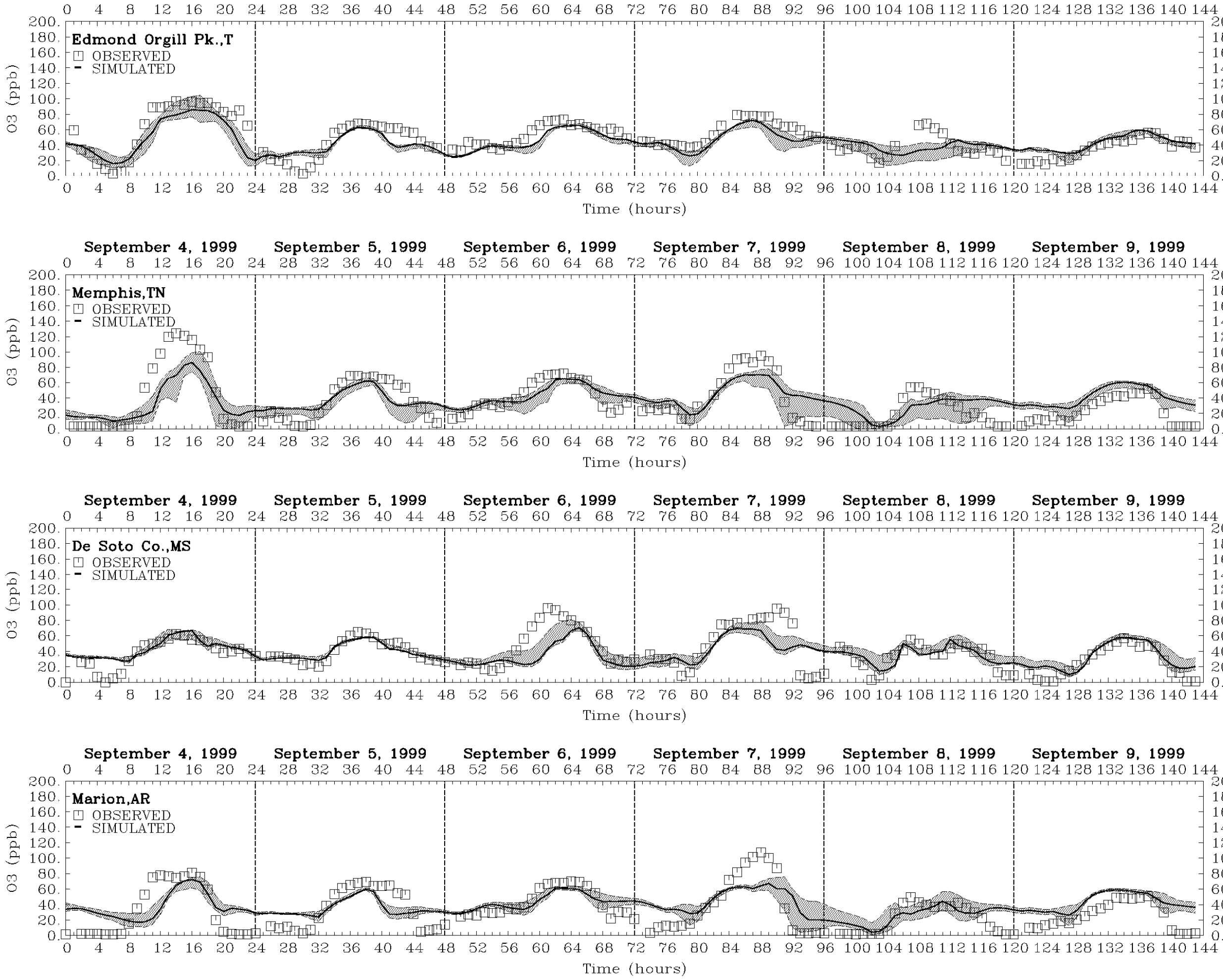


**Figure 2-4a.**
**2001 Episode Time Series: Memphis EAC area**
**June 16-19, 2001**

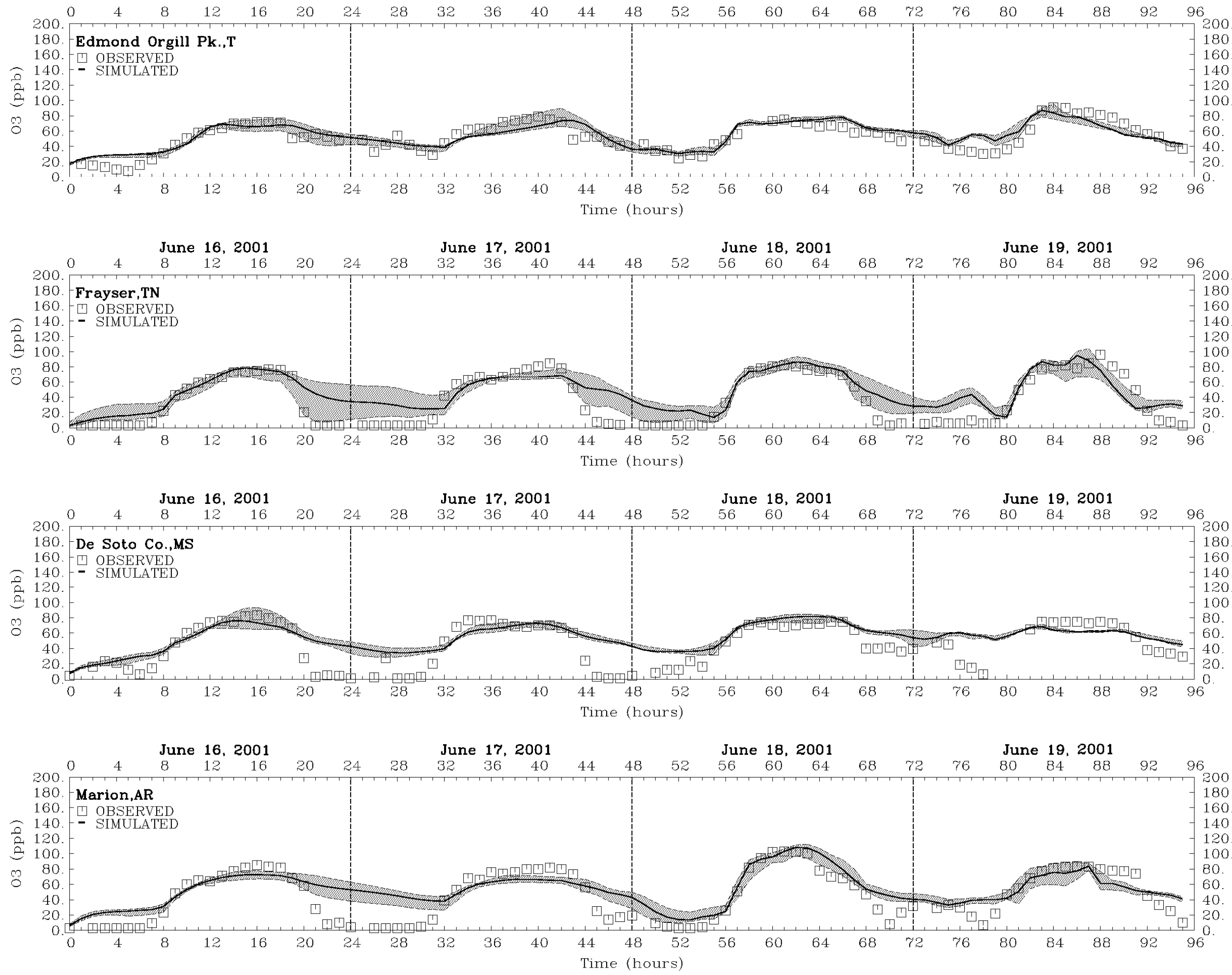


**Figure 2-4b.**
**2001 Episode Time Series: Memphis EAC Area,**
**June 19-22, 2001**

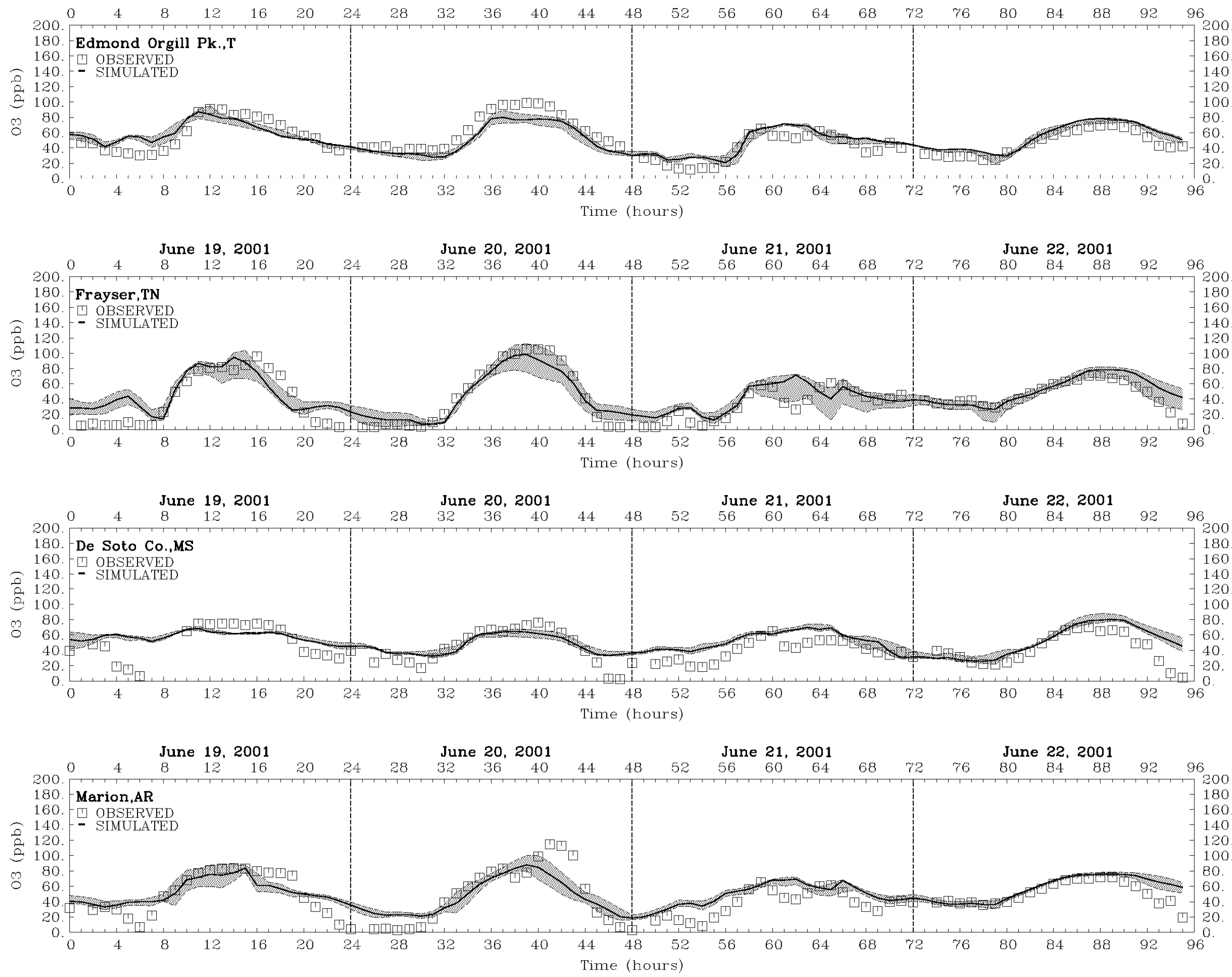


**Figure 2-5a.**
**2001 Episode Time Series: Memphis EAC Area,**
**July 4-7, 2002**

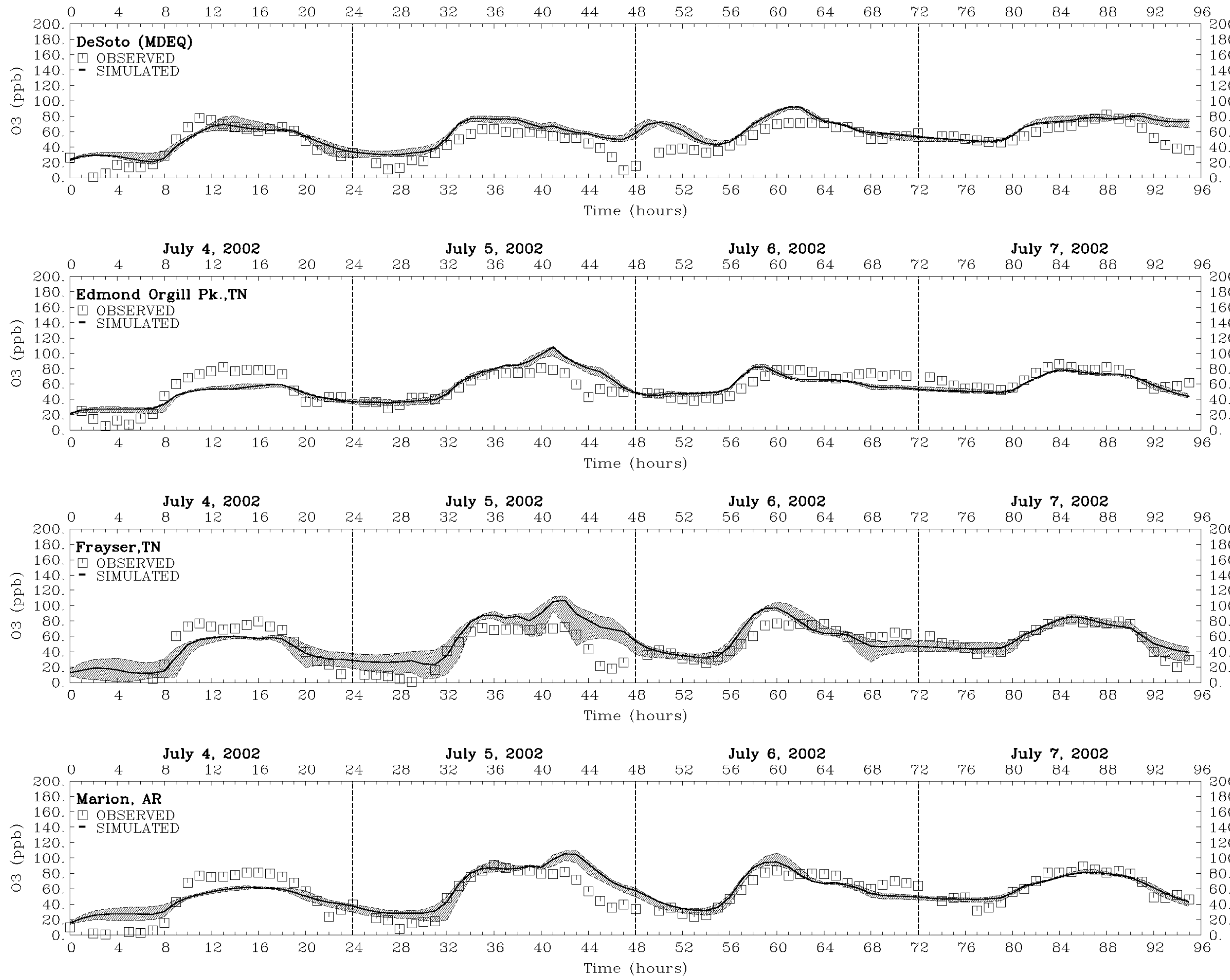
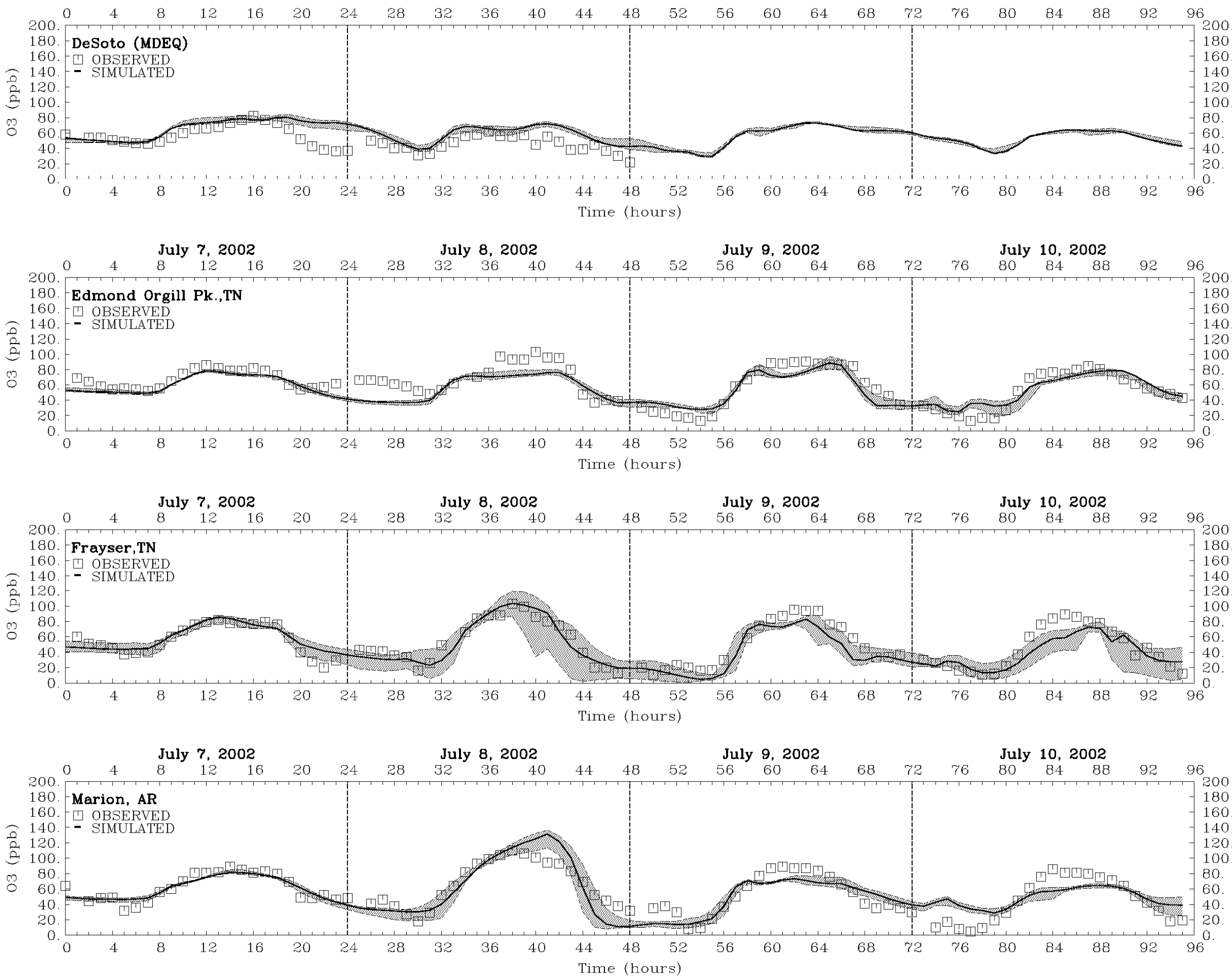


**Figure 2-5b.**
**2001 Episode Time Series: Memphis EAC Area,**
**July 7-10, 2002**



# 3. Future Year Modeling Applications

To support the EDZ assessment, the photochemical modeling system was applied for a current year, two future years, and a variety of future-year emission scenarios. In accordance with EPA guidance on the use of models for 8-hour ozone analysis, the model was first applied for a current year of 2002. The allowed the combination of the results in applying the EPA modeled attainment demonstration procedures, despite the different base years for the three modeling episodes. As discussed in the previous section, use of 2002 as the current year also allowed us to use the most up-to-date National Emissions Inventory (NEI) data.

The model was then applied for 2007 and a model-based attainment demonstration for 8-hour ozone was conducted. One emissions scenario, representing interim growth in Crittenden County to support EDZ development was simulated for 2007.

Next the model was applied for 2009. For this analysis, 2009 is the first year that any new, large proposed facility in Crittenden County would be expected to be fully operational. Three emission scenarios were simulated for 2009, representing different combinations of local growth and national-scale control scenarios.

The 2007 and 2009 baseline emission inventories and modeling results are presented in this section. Results for the alternative emission scenarios are presented in Section 4.

## 3.1. Future-year Emission Inventory Preparation

The methodologies followed in preparing the future-year baseline inventories were identical to those followed in the ATMOS EAC modeling analysis with the following exceptions:

### *3.1.1. Area Source*

Emissions were prepared based on the VISTAS revised 2002 Phase II data including the typical-year area-level fires. Economic projection factors included in EPA's Emission Growth and Analysis System (EGAS), Version 5.0 were used in projecting the 2002 area source emissions for the two future years.

### *3.1.2. Non-Road*

Emissions for aircraft, railroad and commercial marine vessels from the VISTAS revised 2002 Phase II database were projected using EGAS 5.0 economic projection factors. For all other non-road source categories, EPA's draft NONROAD2004 model with monthly maximum, minimum and average temperatures (calculated from the 1971-2000 30-year historical averages) was used to estimate future-year emissions.

### *3.1.3. Point Source*

Future year point source emissions were prepared by applying EGAS 5.0 factors to the VISTAS revised 2002 Phase II typical year data.

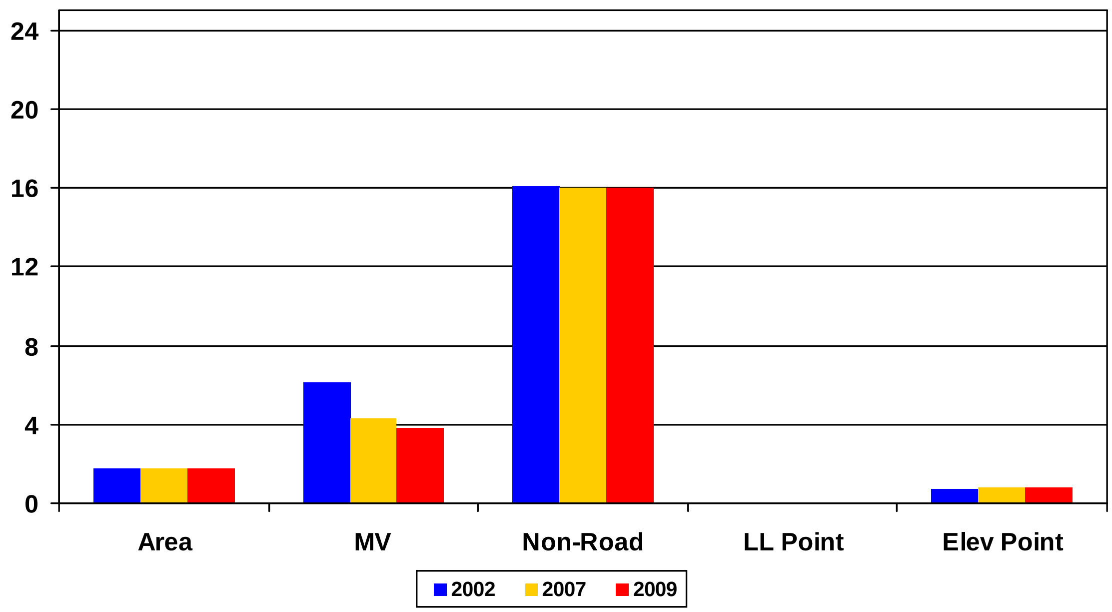
### *3.1.4. Summary of 2007 and 2009 Baseline Emissions*

Through the use of the emission preparation tools (i.e., MOBILE6, NONROAD2004, EGAS5.0, etc.) future year emission estimates were prepared for 2007 and 2009. This inventory includes changes to the 2002 inventory due to expected growth in population and various source sectors, growth in VMT, fleet turnover, plant startups/shut downs, and various national rules that apply in the future years including: Tier 2 fuel sulfur and engine standards, heavy-duty diesel standards, Tier 4 off-road diesel standards, and Phase I of the NOx SIP Call. The 2007 baseline also incorporates additional local controls in the Greater Memphis area: Shelby County—NOx reductions from a lowering of speed limits and NOx RACT controls on a few facilities; DeSoto County—emission reductions associated with ozone season open burning restrictions; Crittenden County—truck stop electrification, Stage I controls at gas stations, replacement of some construction equipment, and expected reductions in mobile source emissions on ozone action days. The differences between the 2007 baseline emissions used for the ATMOS EAC and EDZ modeling exercises are summarized in Appendix A.

Figure 3-1 presents component NOx and VOC emission totals for Crittenden County for 2002, 2007, and 2009, and Figure 3-2 presents component NOx and VOC emission totals for Crittenden and Shelby Counties combined for 2002, 2007, and 2009. The figures indicate expected reductions in future mobile source emissions, reductions in point source emissions due to the NOx SIP call, some minor reductions in non-road emissions, and a decrease in area source VOC emissions in 2007 followed by an increase in 2009, and a slight increase in area source NOx emissions for 2007 and 2009.

**Figure 3-1. Weekday anthropogenic emissions (tpd) in Crittenden County, AR by species and source category.**

Comparison of $NO_x$ Emissions (TPD) by Component




Comparison of VOC Emissions (TPD) by Component

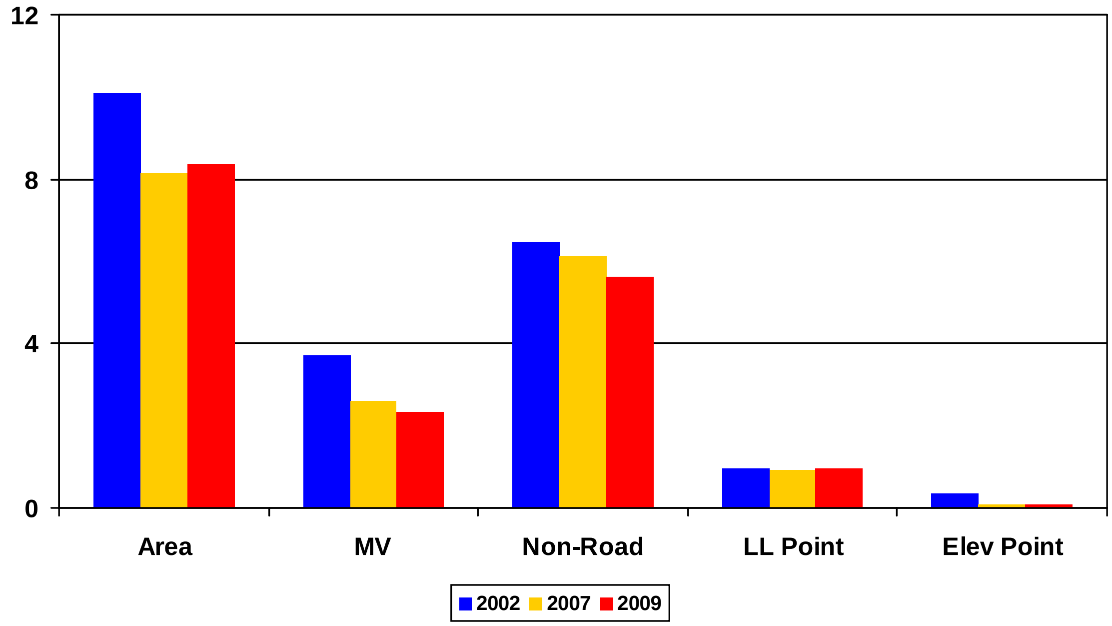
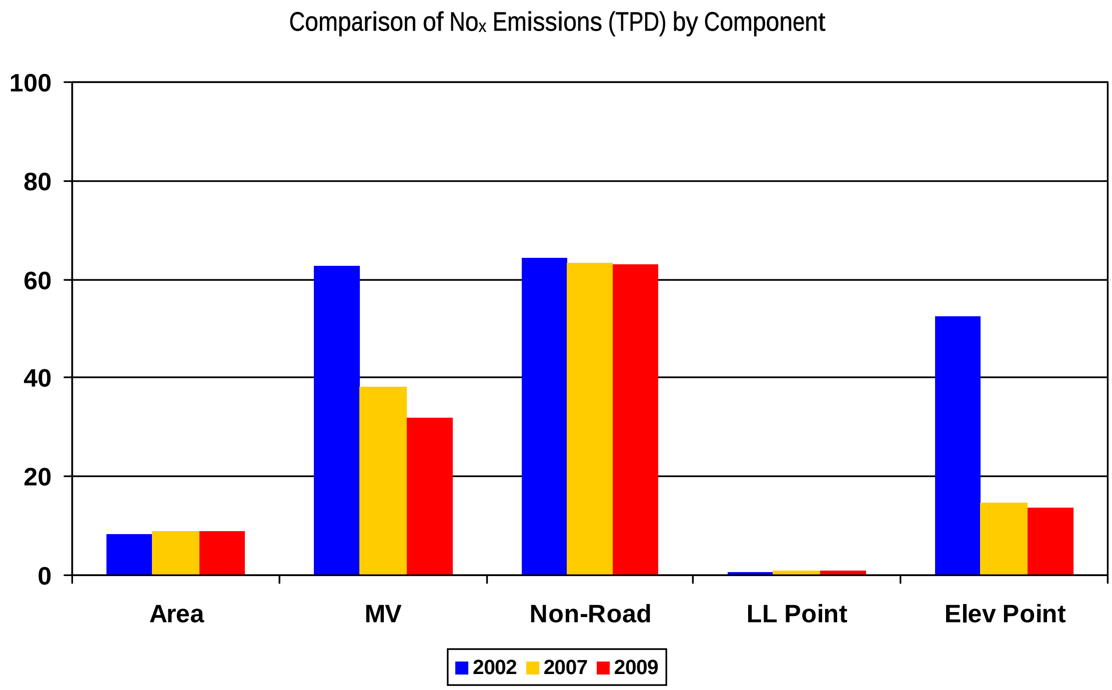
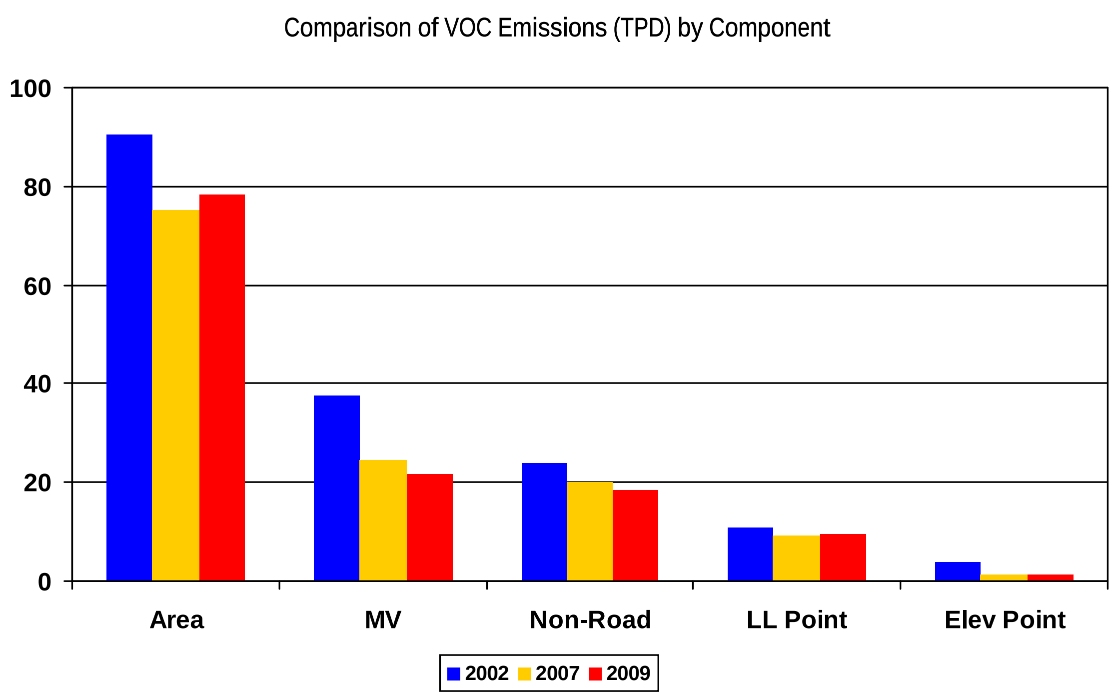


**Figure 3-2. Weekday anthropogenic emissions (tpd) in Crittenden County, AR and Shelby County, TN by species and source category**



## 3.2. Future-year Baseline Results for 2007

The 2007 baseline scenario incorporates the 2007 baseline emissions, as presented in the previous section. Only the emissions inputs were directly modified for the 2007 future-year baseline simulation. However, through the use of the UAM-V "self-generating" ozone boundary conditions technique, the boundary condition values for ozone were also indirectly modified to reflect the expected changes in regional-scale ozone for 2007.

In examining the future-year modeling results, we consider several geographical areas, consisting of the individual counties and the combination of the counties that comprise the greater Memphis area. The focus of the analysis is Crittenden County, but Shelby County (Tennessee) and DeSoto County (Mississippi), which are neighboring counties and also a part of the Memphis MSA, are also considered in the analysis.

One key metric that summarizes the change in 8-hour ozone concentration is the percent change in maximum simulated 8-hour ozone concentration, compared to the 2002 current-year baseline simulation. For Crittenden County, the maximum 8-hour ozone concentration for 2007 is lower by 7.9 percent compared to the 2002 value. This percent reduction also applies to the three-county area. For Shelby County, the reduction is 4.4 percent and for DeSoto County the reduction is 11.4 percent.

Several other metrics summarize the magnitude, frequency, and spatial extent of simulated ozone concentrations above the 8-hour standard. These include 8-hour ozone exceedance exposure (or the amount of ozone, on an 8-hour maximum basis, that is greater than or equal to 85 ppb), number of grid cells with 8-hour ozone concentrations greater than or equal to 85 ppb, number of grid cell hours with 1-hour ozone concentrations greater than or equal to 85 ppb, and 1-hour ozone "exceedance" exposure for concentrations greater than or equal to 85 ppb (or the amount of ozone, on an hourly basis, that is greater than or equal to 85 ppb). Table 3-1 summarizes the results of the 2007 baseline simulation, as illustrated by these area-based metrics.

**Table 3-1a.**
**Comparison of the ADEQ EDZ Current Year (2002)**
**and Future Year Baseline (2007) Simulation Results for All Non-startup Days**

| Area of Interest | 8-hr Ozone Exceedance Exposure | | | # Grid-cells where Maximum 8-hr O3 ≥ 85 ppb | | |
|---|---|---|---|---|---|---|
| | 2002 | 2007 | % Reduction | 2002 | 2007 | % Reduction |
| Crittenden County | 43209.8 | 19779.8 | -54.2 | 239 | 159 | -33.5 |
| Shelby County | 13882.0 | 4816.5 | -65.3 | 161 | 69 | -57.1 |
| DeSoto County | 4015.8 | 616.5 | -84.6 | 49 | 13 | -73.5 |
| Crittenden, Shelby & DeSoto | 61107.6 | 25212.7 | -58.7 | 449 | 241 | -46.3 |

**Table 3-1b.**
**Comparison of the ADEQ EDZ Current Year (2002)**
**and Future Year Baseline (2007) Simulation Results for All Non-startup Days**

| Grid/Area | # Grid Cell-Hours where 1-Hr O3 ≥ 85 ppb | | | 1-Hr Exceedance Exposure for O3 ≥ 85 ppb | | |
|---|---|---|---|---|---|---|
| | 2002 | 2007 | % Reduction | 2002 | 2007 | % Reduction |
| Crittenden County | 2095 | 1322 | -36.9 | 28855.0 | 14652.7 | -49.2 |
| Shelby County | 1577 | 777 | -50.7 | 14082.0 | 6441.1 | -54.3 |
| DeSoto County | 671 | 121 | -82.0 | 4025.3 | 653.6 | -83.8 |
| Crittenden, Shelby & DeSoto | 4343 | 2220 | -48.9 | 46962.3 | 21747.3 | -53.7 |

All of these measures indicate large reductions in ozone concentrations greater than 85 ppb, for both hourly and 8-hour average values. For Crittenden County, the percent reduction ranges from approximately 35 to approximately 55 percent for the four metrics. For the three-county area, the reduction in each of these metrics is about 50 percent.

Another metric that is important in assessing and demonstrating simulated attainment for the future year is the estimated design value (EDV). This test was applied separately for the four monitoring sites in the Memphis area using the latest EPA-recommended procedures on the use of models for 8-hour ozone attainment demonstrations (EPA, 2005 and Timin, 2005). The four sites are: Marion in Crittenden County, Frayser and Edmund Orgill Park in Shelby County, and Hernando in DeSoto County.

The modeled attainment test was applied for the four sites in the Memphis area, using the maximum simulated 8-hour ozone concentration within a 15-km (or 7 by 7 cell) area of influence to calculate the site-specific relative reduction factor (RRF). Current EPA guidance (Timin, 2005) recommends using all days with simulated ozone concentrations greater than 85 ppb in the calculation of the RRFs, but lowering this cut-off value as needed (with a minimum of 70 ppb) to include approximately ten days in the calculation. For this application, the cut-off values that resulted in 10 or more days are: 85 ppb for Frayser, 80 ppb for Edmund Orgill Park, 75 ppb for Marion, and 70 ppb for Hernando. The RRFs were applied to the three-period average design value (DV) for each site to obtain the site-specific future-year estimated design value (EDV) for 2007. The average DV is the average over the three design value periods that include the 2002 current year: 2000-2002, 2001-2003, and 2002-2004. Because it uses the DV value for each three-year period (which is already an average over the three year period), this averaging procedure weights the individual years differently, with the greatest weight given to 2002. Table 3-2 lists the observation-based weighted average DVs for a current year of 2002 and the 2007 EDVs for each site in the area.

**Table 3-2.**
**Weighted-Average and Estimated Design Values (EDVs) for the Memphis Area Ozone Monitoring Sites for the 2007 Baseline Simulation**

| Site | 2002 Weighted Average DV | 2007 EDV |
|---|---|---|
| Marion | 91.0 | 84 |
| Frayser | 83.7 | 79 |
| Edmund Orgill Park | 87.7 | 79 |
| Hernando | 83.3 | 77 |

Two of the four current-year averaged DVs are greater than the 84 ppb ozone standard. For 2007, all of the EDVs are less than or equal to 84 ppb. The maximum value is 84 ppb for the Marion monitoring site. Thus, the simulation results indicate all sites in the Memphis area will be in attainment of the 8-hour ozone standard by 2007, and the modeled attainment test is passed.

Compared to the original ATMOS EAC modeling exercise, the resulting EDVs are lower by 3 to 4 ppb for the four sites. This is due to a combination of factors including lower current-year design values (by 2 to 3 ppb) for all sites due to both the use of a different current year as well as the averaging procedure, and additional simulated emission reductions in the Memphis area (prior modeling showed that these reductions lowered the EDVs by 1 to 2 ppb for these sites). Without further testing, it is not possible to speculate on how the use of updated current-year emissions and projection factors affected the EDV results.

## 3.3. Future-year Baseline Results for 2009

The 2009 baseline scenario incorporates some further emission reductions compared to 2007, as presented in the previous section. These are mostly from on-road motor vehicle emissions. For this simulation, the UAM-V "self-generating" ozone boundary conditions technique was also used to adjust the ozone boundary condition values to 2009 levels (however, there is very little difference in the boundary concentrations between 2002, 2007, and 2009).

For 2009, the percent change in maximum simulated 8-hour ozone concentration, compared to the 2002 current-year baseline simulation is slightly greater in magnitude than that for 2007. For Crittenden County, the maximum 8-hour ozone concentration for 2009 is lower by 9.4 percent compared to the 2002 value. For Shelby County, the reduction is 6.1 percent and for DeSoto County the reduction is 13.2 percent. Overall, for the three-county area, the percent reduction is 9.3 percent.

Table 3-3 presents several other metrics that summarize the magnitude, frequency, and spatial extent of simulated ozone concentrations above the 8-hour standard.

**Table 3-3a.**
**Comparison of the ADEQ EDZ Current Year (2002) and Future Year Baseline (2009) Simulation Results for All Non-startup Days**

| Area of Interest | 8-hr Ozone Exceedance Exposure | | | # Grid-cells where Maximum 8-hr O3 ≥ 85 ppb | | |
|---|---|---|---|---|---|---|
| | 2002 | 2009 | % Reduction | 2002 | 2009 | % Reduction |
| Crittenden County | 43209.8 | 16132.2 | -62.7 | 239 | 149 | -37.7 |
| Shelby County | 13882.0 | 3677.0 | -73.5 | 161 | 54 | -66.5 |
| DeSoto County | 4015.8 | 320.2 | -92.0 | 49 | 9 | -81.6 |
| Crittenden, Shelby & DeSoto | 61107.6 | 20129.5 | -67.1 | 449 | 212 | -52.8 |

**Table 3-3b.**
**Comparison of the ADEQ EDZ Current Year (2002) and Future Year Baseline (2009) Simulation Results for All Non-startup Days**

| Grid/Area | # Grid Cell-Hours where 1-Hr O3 ≥ 85 ppb | | | 1-Hr Exceedance Exposure for O3 ≥ 85 ppb | | |
|---|---|---|---|---|---|---|
| | 2002 | 2009 | % Reduction | 2002 | 2009 | % Reduction |
| Crittenden County | 2095 | 1209 | -42.3 | 28855.0 | 12476.5 | -56.8 |
| Shelby County | 1577 | 671 | -57.5 | 14082.0 | 5384.8 | -61.8 |
| DeSoto County | 671 | 103 | -84.7 | 4025.3 | 433.1 | -89.2 |
| Crittenden, Shelby & DeSoto | 4343 | 1983 | -54.3 | 46962.3 | 18294.4 | -61.0 |

As for 2007, all of these measures indicate large reductions in ozone concentrations greater than 85 ppb, for both hourly and 8-hour average values, between 2002 and 2009. For Crittenden County, the percent reduction ranges from approximately 40 to 60 percent for the four metrics. For the three-county area, the reduction in each of these metrics is about 55 to 60 percent.

Table 3-4 lists the 2009 EDVs for each site in the Memphis area. The same procedures used to calculate the EDVs for 2007 (as described in the previous section) were applied to the calculation of the EDVs for 2009.

**Table 3-4.**
**Weighted-Average and Estimated Design Values (EDVs)**
**for the Memphis Area Ozone Monitoring Sites for the 2009 Baseline Simulation**

| Site | 2002 Weighted Average DV | 2009 EDV |
|---|---|---|
| Marion | 91.0 | 83 |
| Frayser | 83.7 | 78 |
| Edmund Orgill Park | 87.7 | 77 |
| Hernando | 83.3 | 76 |

For 2009, all of the EDVs are less than or equal to 84 ppb. The maximum value is 83 ppb for the Marion monitoring site. Thus, the simulation results indicate all sites in the Memphis area will continue to be in attainment of the 8-hour ozone standard by 2009, with an approximate 1 ppb further improvement in ozone concentrations compared to 2007.

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# 4. EDZ Impact Modeling Analysis

Several additional applications of the photochemical model were conducted in order to examine the potential impacts of growth in industrial and transportation-related emissions in Crittenden County—to support the assessment of whether the county should be established as an economic development zone.

One scenario was run for 2007, and emissions representing interim growth in Crittenden County, as needed to support future EDZ development, were incorporated into the 2007 baseline emissions.

Three scenarios were examined for 2009—the first year for which any new, large proposed facility in Crittenden County would be expected to be fully operational. These included two levels of emissions changes for key locations in the county where additional growth is possible, as well as the incorporation of the emissions reductions associated with EPA's Clean Air Interstate Rule (CAIR). In addition to the alternative emissions scenarios, the UAM-V ozone tagging methodology was used as a check on the reasonableness of the simulated impacts.

The emissions and results for the 2007 and 2009 EDZ scenarios are presented in this section. We begin with a brief overview of the metrics used to quantify the impacts of the emissions changes for each of the scenarios.

## 4.1. Overview of Metrics Used for Impact Assessment

For each scenario, a variety of graphical displays and metrics were used to assess and quantify the ozone air quality impacts associated with the EDZ-related emissions changes. Of primary importance is the impact on (modeled) attainment for 8-hour ozone, and we applied the EPA modeled attainment test (as described in Section 3) to establish this impact. We also use additional analyses to establish the spatial and temporal distribution and significance of any impacts.

Several metrics were used to characterize impacts on the county and MSA levels. These include:

- Maximum 8-hour ozone concentration
- 8-hour ozone exceedance exposure
- Number of grid cells with simulated 8-hour ozone concentrations ≥ 85 ppb
- Number of grid cell-hours with simulated 1-hour ozone concentrations ≥ 85 ppb
- Amount of ozone ≥ 85 ppb summed over all hours and grid cells.

Two additional metrics were use to characterize impacts in the vicinity of each site. These include:

- Simulated maximum 8-hour ozone in the vicinity[1] of any monitor
- Estimated design value (EDV).

The first five metrics were calculated separately for Crittenden, Shelby and DeSoto Counties and for the three counties combined. The next two metrics were calculated for all four sites in

[1] Defined by the 7 by 7 array of grid cells surrounding each monitoring site, or an approximate 15-km radius of influence

the MSA. In defining these metrics, we have used ≥ 85 ppb, since the latest EPA guidance uses this convention for these same (and similar) metrics. The overall impact was assessed based on all of the metrics, with emphasis on the estimated design value.

## 4.2. EDZ Scenarios

### *4.2.1. 2007 Interim Growth Scenario*

If the EDZ designation is granted to Crittenden County say, in early 2006, it may take a few years for any large industrial facility to be designed, permitted, built, and ready to begin operating. In the meantime, it's possible that various other industries might be able to begin operating in the County within a year. Thus, the interim growth scenario was conducted to emulate industrial growth that may occur in Crittenden County in 2007 if the EDZ designation is granted in early 2006.

#### Emissions

For this scenario, emissions estimates from an existing industrial manufacturing facility located in the southeastern U.S. were used to simulate expected impacts on ozone concentrations. The hypothetical facility contains numerous "low-level" stacks and the facility was expected to be operating 24 hours per day and seven days per week (or 24/7). For the simulations, the emissions were assumed to be vented through one representative stack and with the following rates:

$NO_x$—0.93 tpd (339 tpy)

VOC—5.3 tpd (1934 tpy)

CO—0.76 tpd (277 tpy)

where tpd is tons per day, and tpy is tons per year.

For the interim growth scenario, the hypothetical source was located at the Crittenden County Port site, located on the Mississippi River in southeast Crittenden County, southwest of Memphis (756800 E, 3888100 N in UTM Zone 15). The inclusion of this facility at the Port site represents a 4 percent increase in anthropogenic $NO_x$ emissions and a 30 percent increase in anthropogenic VOC emissions in Crittenden County, above the expected 2007 baseline.

## Modeling Results

The simulation results are summarized in Table 4-1, which gives the values for all of the impact-related 8-hour ozone metrics.

**Table 4-1a.**
**8-Hour Ozone Impacts: 2007 Port Site Interim Growth Scenario**

| Area of Interest | Greatest Increase in Daily Maximum 8-hr O3 (ppb) | |
|---|---|---|
| | 2007 Port Site Interim Growth Scenario | % Change |
| Crittenden County | 1.0 | 1.5 |
| Shelby County | 0.5 | 0.5 |
| DeSoto County | 0.2 | 0.3 |
| Crittenden, Shelby & DeSoto | 1.0 | 0.9 |

**Table 4-1b.**
**8-Hour Ozone Impacts: 2007 Port Site Interim Growth Scenario**

| Area of Interest | 8-hr Ozone Exceedance Exposure | | | # Grid-cells where Maximum 8-hr O3 ≥ 85 ppb | | |
|---|---|---|---|---|---|---|
| | 2007 | 2007 Port Site Interim Growth Scenario | % Change | 2007 | 2007 Port Site Interim Growth Scenario | % Change |
| Crittenden County | 19779.8 | 20317.5 | 2.7 | 159 | 160 | 0.6 |
| Shelby County | 4816.5 | 4983.3 | 3.5 | 69 | 68 | -1.4 |
| DeSoto County | 616.5 | 615.0 | -0.2 | 13 | 13 | 0.0 |
| Crittenden, Shelby & DeSoto | 25212.7 | 25915.7 | 2.8 | 241 | 241 | 0.0 |

**Table 4-1c.**
**8-Hour Ozone Impacts: 2007 Port Site Interim Growth Scenario**

| Grid/Area | # Grid Cell-Hours where 1-Hr O3 ≥ 85 ppb | | | 1-Hr Exceedance Exposure for O3 ≥ 85 ppb | | |
|---|---|---|---|---|---|---|
| | 2007 | 2007 Port Site Interim Growth Scenario | % Change | 2007 | 2007 Port Site Interim Growth Scenario | % Change |
| Crittenden County | 1322 | 1340 | 1.4 | 14652.7 | 14983.0 | 2.3 |
| Shelby County | 777 | 799 | 2.8 | 6441.1 | 6571.6 | 2.0 |
| DeSoto County | 121 | 122 | 0.8 | 653.6 | 654.0 | 0.1 |
| Crittenden, Shelby & DeSoto | 2220 | 2261 | 1.8 | 21747.3 | 22208.5 | 2.1 |

**Table 4-1d.**
**8-Hour Ozone Impacts: 2007 Port Site Interim Growth Scenario**

| Monitoring Site | Greatest Increase in Daily Maximum 8-hr O3 Near the Vicinity of a Monitor (ppb) | Estimated Design Value (ppb) | |
|---|---|---|---|
| | 2007 Port Site Interim Growth Scenario | 2007 | 2007 Port Site Interim Growth Scenario |
| Marion | 1.0 | 84 | 84 |
| Frayser | 1.0 | 79 | 79 |
| Edmund Orgill Park | 0.3 | 79 | 79 |
| Hernando | 0.1 | 77 | 77 |

The summary table shows that the greatest increase in simulated maximum 8-hour ozone resulting from the emissions at the port site for 2007 is 1 ppb. This occurs in Crittenden County and represents a 1.5 percent increase in simulated maximum ozone concentration. The calculated 8-hour ozone exceedance exposure for Crittenden County is higher in the interim growth scenario by 2.7 percent, while that for the three-county area is higher by 2.8 percent. There is a greater percentage increase in the value of this metric for Shelby County. The number of grid cells with 8-hour exceedance concentrations is essentially unchanged, but when hourly values are considered there is an increase on the order of 2 percent. Similarly, 1-hour ozone exceedance exposure is increased by about 2 percent for Crittenden and Shelby Counties and overall. The greatest increase in 8-hour ozone in the vicinity of any site is near the Marion site and is the same increase listed for the county, namely 1 ppb. The design value for all sites is unchanged from the 2007 baseline value.

For this scenario, simulated attainment for 2007 is not affected by the additional emissions. The metrics indicate that the increase in ozone is very small and that the simulated concentrations are increased by a maximum of 1 ppb.

### *4.2.2. 2009 Supersite and Port Site Scenario*

As noted above, if the EDZ designation is granted to Crittenden County say, in early 2006, it may take a few years for any large industrial facility to be designed, permitted, built, and ready to begin operating. Thus, a more realistic scenario for a large industrial facility to be located within Crittenden County is to assume the facility could be operating in 2009. This scenario assumes that the facility will be located at an existing site, referred to as the Supersite, which is located just west of the City of Marion in east central Crittenden County (753500 E, 3897300 N in UTM Zone 15). This site is favored because of the availability of vacant land and proximity to transportation, energy, and other necessary supporting infrastructure. This scenario also assumes that the industrial growth assumed to be realized by 2007 at the Port Site continues in 2009. Thus, this scenario is referred to as the Supersite and Port Site scenario.

## Emissions

For this scenario, emissions estimates from the same industrial manufacturing facility used for the Port Site interim growth scenario were also included at the Supersite. The hypothetical facilities contain numerous "low-level" stacks and the facilities are expected to be operating 24/7. For the simulations, the emissions were assumed to be vented through one representative stack and the emissions for each facility are as follows:

NOx—0.93 tpd (339 tpy)

VOC—5.3 tpd (1934 tpy)

CO—0.76 tpd (277 tpy)

The inclusion of this facility at the Supersite and Port Site represents an 8 percent increase in anthropogenic NOx emissions and a 60 percent increase in anthropogenic VOC emissions in Crittenden County above the expected 2009 baseline.

## Modeling Results

The simulation results are summarized in Table 4-2, which gives the values for all of the impact-related 8-hour ozone metrics.

**Table 4-2a.**
**8-Hour Ozone Impacts: 2009 Supersite & Port Site Growth Scenario**

| Area of Interest | Greatest Increase in Daily Maximum 8-hr O3 (ppb) | |
|---|---|---|
| | 2009 Supersite & Port Site Growth Scenario | % Increase |
| Crittenden County | 1.5 | 1.4 |
| Shelby County | 0.6 | 0.6 |
| DeSoto County | 0.3 | 0.5 |
| Crittenden, Shelby & DeSoto | 1.5 | 1.4 |

**Table 4-2b.**
**8-Hour Ozone Impacts: 2009 Supersite and Port Site Growth Scenario**

| Area of Interest | 8-hr Ozone Exceedance Exposure | | | # Grid-cells where Maximum 8-hr O3 ≥ 85 ppb | | |
|---|---|---|---|---|---|---|
| | 2009 | 2009 Supersite & Port Site Growth Scenario | % Change | 2009 | 2009 Supersite & Port Site Growth Scenario | % Change |
| Crittenden County | 16132.2 | 17095.9 | 6.0 | 149 | 153 | 2.7 |
| Shelby County | 3677.0 | 3867.2 | 5.2 | 54 | 55 | 1.9 |
| DeSoto County | 320.2 | 317.4 | -0.9 | 9 | 9 | 0.0 |
| Crittenden, Shelby & DeSoto | 20129.5 | 21280.5 | 5.7 | 212 | 217 | 2.4 |

**Table 4-2c.**
**8-Hour Ozone Impacts: 2009 Supersite & Port Site Growth Scenario**

| Grid/Area | # Grid Cell-Hours where 1-Hr O3 ≥ 85 ppb | | | 1-Hr Exceedance Exposure for O3 ≥ 85 ppb | | |
|---|---|---|---|---|---|---|
| | 2009 | 2009 Supersite & Port Site Growth Scenario | % Change | 2009 | 2009 Supersite & Port Site Growth Scenario | % Change |
| Crittenden County | 1209 | 1221 | 1.0 | 12476.5 | 13048.1 | 4.6 |
| Shelby County | 671 | 682 | 1.6 | 5384.8 | 5540.0 | 2.9 |
| DeSoto County | 103 | 103 | 0.0 | 433.1 | 432.6 | -0.1 |
| Crittenden, Shelby & DeSoto | 1983 | 2006 | 1.2 | 18294.4 | 19020.6 | 4.0 |

**Table 4-2d.**
**8-Hour Ozone Impacts: 2009 Supersite & Port Site Growth Scenario**

| Monitoring Site | Greatest Increase in Daily Maximum 8-hr O3 Near the Vicinity of a Monitor (ppb) | Estimated Design Value (ppb) | |
|---|---|---|---|
| | 2009 Supersite & Port Site Growth Scenario | 2009 | 2009 Supersite & Port Site Growth Scenario |
| Marion | 1.6 | 83 | 83 |
| Frayser | 1.1 | 78 | 78 |
| Edmund Orgill Park | 0.4 | 77 | 78 |
| Hernando | 0.2 | 76 | 76 |

The summary table shows that the greatest increase in simulated maximum 8-hour ozone concentration (for each county or the multi-county area) resulting from the emissions at both the Supersite and the Port Site for 2009 is 1.5 ppb. This occurs in Crittenden County and represents a 1.4 percent increase in simulated maximum ozone concentration. The calculated 8-hour ozone exceedance exposure for Crittenden County is higher in the EDZ growth scenario by 6 percent, and this represents an overall increase for the three-county area of 5.7 percent. The number of grid cells with 8-hour exceedance concentrations is increased slightly (by about 2 to 3 percent); when hourly values are considered there is an increase of about 1 percent. One-hour ozone exceedance exposure is increased by 4.6 percent for Crittenden County and by 4 percent and overall. The greatest increase in 8-hour ozone in the vicinity of any site is near the Marion site and is 1.6 ppb. The estimated design value for the Edmund Orgill Park site is increased by 1 ppb, while that for the other three sites is not changed from the 2009 baseline value. The EDV remains less than 84 ppb for all four sites.

For this scenario, simulated attainment for 2009 is not affected by the additional emissions and the modeled attainment test is passed. The metrics indicate that the increase in ozone is very small, but that the area of high ozone is increased slightly. The simulated concentrations are increased by a maximum of approximately 1.5 ppb.

## Ozone and Precursor Tagging Methodology (OPTM) Application

The UAM-V Ozone and Precursor Tagging Methodology (OPTM), was also used in this analysis to examine the contributions from hypothetical new facilities to simulated ozone concentrations, and specifically the Supersite and Port Site facilities. OPTM was applied using an earlier version of the 2007 inventory, but the results are included here as a qualitative check on the concentration differences that are simulated for 2009 when the two sources are included in the emissions inventory.

OPTM provides estimates of the contribution of emissions from specified source categories or source regions to the simulated ozone concentrations. The estimates are made for the existing conditions within the simulation and do not require that the system be perturbed (e.g., zeroed out) in order to make the estimate. In addition, estimates for several categories can be made in a single simulation.

### OVERVIEW OF THE OPTM TECHNIQUE

Ozone exists in the atmosphere in a dynamic equilibrium with NO and $NO_2$. $NO_2$ is photolyzed by sunlight to form NO and a free oxygen atom that combines with an oxygen molecule to form ozone. The ozone and NO recombine rapidly to reform the $NO_2$ and oxygen molecules. Since it is the oxidized form of the molecules that contribute directly to the ozone present at a given time, a useful quantity to consider is the amount of oxidant present, the sum of $NO_2$ and ozone. While ozone may drop rapidly when fresh NO emissions are added to the system, the amount of oxidant varies more slowly. When the NO emissions are added, ozone is converted to $NO_2$, but the sum of $NO_2$ and ozone stays the same. The amount of oxidant present varies slowly, increasing due to the interaction of VOCs, $NO_x$ and sunlight, and decreasing through removal processes such as deposition and conversion to nitric acid. The OPTM system tracks the amount of oxidant (the sum of $NO_2$ and ozone) formed from various tagged source categories as a method of estimating the contributions to ozone.

In order to estimate the contributions to ozone, OPTM sets up several new tracer species in a simulation that are used to tag emissions or chemical products. The total emissions of VOC and $NO_x$ from the desired categories are tagged. For illustration, we will assume that there are two categories (Category 1 and Category 2), with VOC-1 and NOX-1 and VOC-2 and NOX-2 corresponding to the two categories. In addition to these emissions tracers, oxidant tracers called OXN-1, OXV-1, OXN-2, and OXV-2 are added. These correspond to the oxidant produced from $NO_x$ and VOC in each of the two categories.

All of the tracers are advected (transported throughout the domain) in the same manner as the other modeled species. They also undergo deposition, but a deposition velocity is not calculated for the tracers. Instead, the fractional change of oxidant (meaning NO2 + O3) is calculated due to the effects of deposition, and this same fractional change is applied to the oxidant tracers. Similarly, the VOC and $NO_X$ tracers are adjusted according to the change in the total VOC and $NO_X$.

A crucial step in the OPTM system is the calculation of the change in oxidant during the chemistry step of the model. Prior to the chemistry step, total VOC, total $NO_X$, and total oxidant are calculated. The chemistry step is then called as usual, using the standard CB-V species (NO, $NO_2$, $O_3$, PAR, OLE, TOL, etc.). After the chemistry step, new values of total VOC, $NO_X$, and oxidant are calculated so that the change in VOC, $NO_X$, and oxidant (ΔVOC, ΔNOX, and ΔOX) can be calculated.

The change in OXN-1 is ΔOX*NOX-1/(NOX-1 + NOX-2), where the NOX-1 and NOX-2 values correspond to the beginning of the time step. Similarly, the change in OXV-1 is ΔOX*VOC-1/(VOC-1 + VOC-2). The same calculations are made for the Category 2 tracers.

The changes in the VOC and NOX tracers are also calculated. The change in VOC-1 is ΔVOC/VOC * VOC-1 and the change in NOX-1 is ΔNOX/NOX*NOX-1, with corresponding calculations for the Category 2 tracers.

The simulation proceeds as usual from this point.

After the simulation is complete, the ozone attributed to a source category is calculated using both the calculated ozone concentration and the oxidant tracer concentrations, as follows:

Ozone attributed to Category 1 $NO_x$ = O3*OXN-1/(OXN-1 + OXN-2).

Ozone attributed to Category 2 $NO_x$ = O3*OXN-2/(OXN-1 + OXN-2).

Ozone attributed to Category 1 VOC = O3*OXV-1/(OXV-1 + OXV-2).

Ozone attributed to Category 2 VOC = O3*OXV-2/(OXV-1 + OXV-2).

The OPTM tags can be defined to represent geographic areas or assigned to categories of emissions (such as mobile, elevated point source, low-level, etc.) There is no explicit limit to the number of VOC or $NO_x$ tags that can be set up within a single simulation.

#### OPTM SIMULATION RESULTS

For this study, the OPTM technique was used to estimate the contribution of both $NO_x$ and VOC emissions from hypothetical facilities located at the Supersite and Port Site locations in Crittenden County. We quantified the contribution from each facility to each monitoring site and found that the greatest contributions occur at the Marion site. For the Marion site, the contribution from emissions at the Port Site is approximately 0.15 ppb, averaged over all simulation days. The impact from VOC emissions is greater than that from the $NO_x$ emissions. The contribution from emissions from the Supersite is approximately 0.9 ppb. Here the impact from VOC emissions is less than that from the $NO_x$ emissions. For all other sites, the contribution from both sites is less than or approximately equal to 0.1 ppb, and the impact from VOC emissions is generally approximately equal to that from $NO_x$ emissions.

Overall, these results are consistent with the contributions estimated by adding the facilities to the modeling emission inventories, especially with regard to the spatial and temporal distribution of the contributions. The tagged contributions tend to be slightly larger, on average, than the contributions obtained by adding the facility emissions. Some differences are expected, due to the changes in the chemistry introduced by adding or subtracting emissions. What the OPTM results tell us is that the calculated impacts are clearly within the range of the expected contribution from the hypothetical facilities, and thus support the meaningfulness of the results in the context of grid-base modeling. The OPTM results also suggest that the relative contributions of VOC and $NO_x$ from any new facility will vary with distance from the facility.

### *4.2.3. 2009 CAIR Scenario*

EPA recently passed the Clean Air Interstate Rule (CAIR) that stipulates $NO_x$ and $SO_2$ reductions for electric generating units (EGUs) located in 22 eastern states including Texas, Arkansas, Mississippi and Louisiana. State emission budgets were established by EPA in their rulemaking process and states will also have to participate in a cap and trade program. Phase I of CAIR begins in 2009 while Phase II begins in 2015. Although it is difficult to estimate how any one EGU will comply with CAIR in the future, the expected benefits from NOx reductions on EGUs located in Arkansas and surrounding states was simulated in this scenario for 2009.

#### Emissions

In this scenario, expected NOx reductions from applicable EGUs were applied to the 2009 Supersite and Port Site scenario emissions to assess the local benefits of CAIR to the Crittenden County/Memphis MSA. The Supersite/Port Site scenario emissions were modified as follows:

- Applied $NO_x$ emissions reductions for Entergy facilities located in States of Arkansas, Louisiana and Mississippi from their 2009 level to reflect Phase I CAIR controls. The unit-specific control factors were calculated based on the projected 2009 NOx removal percentages provided by Entergy.

- Applied $NO_x$ emissions reductions for Southern Company sources reflecting Phase I CAIR controls. The unit-specific control factors for various units were provided Southern Company.
- Applied 50 percent $NO_x$ emissions reductions for all other EGU units located in States of Arkansas, Florida, Iowa, Louisiana and Mississippi from their 2009 levels to reflect Phase I CAIR controls.
- Applied 50 percent $NO_x$ emissions reductions for the EGU units located outside of Houston-Galveston, Beaumont-Port Arthur, and Dallas-Fort Worth non-attainment areas in State of Texas from their 2009 levels (excluding the units for which NOx emissions reductions already in place from 2002 to 2007).

The last two assumptions were applied because of the lack of facility-specific information. For Texas, it was assumed that EGUs located within nonattainment areas already would be subject to $NO_x$ reductions as reflected in their 2007 baseline estimates provided by the State. No $NO_x$ reductions from CAIR were realized in 2009 in Tennessee and Missouri because both of these states were subject to the $NO_x$ SIP call and it was assumed that compliance with the $NO_x$ SIP Call would also equal compliance with Phase I of CAIR.

### Modeling Results

The application of CAIR controls lowers the simulated ozone concentrations slightly, thus providing an additional buffer for the modeled attainment test. Table 4-3 shows that the estimated design values for all sites are back to the 2009 baseline values when CAIR is applied.

**Table 4-3.**
**Estimated Design Values for the 2009 Baseline, 2009 Supersite and Port Site Growth Scenario, and the 2009 Supersite and Port Site Scenario with CAIR.**

| Monitoring Site | Estimated Design Value (ppb) | | |
|---|---|---|---|
| | 2009 | 2009 Supersite & Port Site Growth Scenario | 2009 Supersite & Port Site Growth Scenario w/CAIR |
| Marion | 83 | 83 | 83 |
| Frayser | 78 | 78 | 78 |
| Edmund Orgill Park | 77 | 78 | 77 |
| Hernando | 76 | 76 | 76 |

## *4.2.4. 2009 Expanded Supersite & Port Site Scenario*

This scenario was conducted to estimate the effects of additional emissions growth (above and beyond the industrial facilities placed at the Port Site and Supersite) that may be allowable and sustainable in Crittenden County in 2009 as reductions are being realized from other source sectors (e.g., mobile sources from local fleet turnover) and national rules that come fully in to play by 2009. The intent was to also simulate the effects of growth in other sectors (e.g., population and transportation) that may result from the development of the hypothetical industrial facilities. However, the changes in emissions are likely much larger than could be realized by 2009.

## Emissions

The emission estimates that were used in this scenario were derived with the following assumptions:

- Increase emissions of the industrial facilities located at the Supersite and Port Site locations by 50 percent to emulate supporting industry/additional growth near these sites. This results in the following increases in emissions at these sites: NOx: 0.46 tpd, VOC: 2.6 tpd, and CO: 0.38 tpd.
- Increase emissions in grid cells containing the Supersite and Port Site by 0.5 tpd (NOx+VOC) to emulate increased emissions from transportation-related sources (cars, trucks, trains, barges, etc.) in the vicinity of these sites.

This scenario includes reasonable assumptions/estimates for expected increases in emissions from other sources (industrial and transportation-related) within the Crittenden EDZ that may occur in the future with the development of these sites. The inclusion of the facilities at the Supersite and Port Site and the expanded growth in other sectors represents a 14.7 percent increase in anthropogenic NOx emissions and a 90 percent increase in anthropogenic VOC emissions in Crittenden County above the expected 2009 baseline.

## Modeling Results

The expanded growth scenario increases the source/infrastructure emissions by a significant amount and was conducted as a bounding calculation. Table 4-4 shows that the estimated design values are increased slightly for this scenario, but are still less than or equal to 84 ppb for all sites.

**Table 4-4.**
**Estimated Design Values for the 2009 Baseline, 2009 Supersite and Port Site Growth Scenario, 2009 Supersite and Port Site Scenario with CAIR, and the Expanded Growth Scenario with CAIR.**

| Monitoring Site | Estimated Design Value (ppb) | | | |
|---|---|---|---|---|
| | 2009 Baseline | 2009 Supersite & Port Site Growth Scenario | 2009 Supersite & Port Site Growth Scenario w/CAIR | 2009 Expanded Supersite & Port Site Growth Scenario w/CAIR |
| Marion | 83 | 83 | 83 | 84 |
| Frayser | 78 | 78 | 78 | 78 |
| Edmund Orgill Park | 77 | 78 | 77 | 78 |
| Hernando | 76 | 76 | 76 | 76 |

### 4.2.5. Screening Test

The screening test is intended as an accompaniment to the modeled attainment test and is specifically applied to areas in the domain where the simulated maximum 8-hour ozone concentrations (for the current-year baseline simulation) are consistently greater than any in the vicinity of a monitoring site. In applying the screening test, we followed the EPA guidance from February 2005, but expanded the area of search for screening test locations to include the counties adjacent to the non-attainment counties as well as the non-attainment counties (consistent with the October 2005 update to the guidance). The guidance defines “consistently” as 25 percent or more of the simulation days. Thus, the screening test is designed to be applied to an array of grid cells where the simulated maximum 8-hour ozone concentrations are higher than any near a monitored location on 25 percent or more of the simulation days. The screening test procedures are otherwise identical to the attainment test procedures; the current-year design value for the unmonitored area is set equal to the value for the nearest monitoring site or to an interpolated value based on several neighboring sites.

The specific application procedures are as follows. We first examined the current-year simulation results in order to identify whether any grid cells within the non-attainment and surrounding counties have daily maximum simulated 8-hour ozone concentrations that are greater than any near a monitor on 25 percent or more of the non-start-up simulation days. The area of search included Shelby, Fayette, and Tipton Counties in Tennessee, DeSoto, Tunica, and Marshall Counties in Mississippi, and Crittenden, St. Francis, Cross, Poinsett, and Mississippi Counties in Arkansas. The non-attainment area is currently defined as Shelby and Crittenden Counties, and the other counties included in the search are adjacent to the two county non-attainment area. We defined “near a monitor” as the 7 by 7 grid cell area (49 grid cell area or approximate 15-km radius) surrounding each monitoring sites. We searched the area outlined above and found no grid cells with higher concentrations than near a monitor on 25 percent or more of the days.

To examine the veracity of these results, we redefined “near a monitor” as the 3 by 3 grid cell area (9 grid cell or approximately 6-km radius) and again checked each grid cell in the multi-county area against the criteria. Since the 7 by 7 grid cell definition will always give higher or equal concentrations to the 9-cell definition for the value near a monitoring site, this approach has the effect of relaxing the criteria. In fact, three locations, all of which are located in Shelby County, were identified.

Even though the screening test was not required under these circumstances, we designated each of these three locations as pseudo sites and analyzed the simulation results at these locations – primarily to enhance the robustness of the modeling results, in terms of the geographical representativeness of the attainment test results. The pseudo sites are located in southwest (Pseudosite #1), northeast (and central) (Pseudosite #2), and southeast (Pseudosite #3) Shelby County, respectively. For each of these three locations, the attainment test was applied for the 2007 and 2009 future year baseline scenarios and each EDZ scenario.

Each pseudo site was assigned a current-year design value equal to the a distance-weighted average of the design values for the neighboring sites, using a simple version of the Voronoi neighbor averaging (VNA) interpolation approach, as mentioned in the October version of the EPA guidance document. The alternative was to simply use the values for Edmund Orgill Park and Frayser monitoring sites to represent the pseudo sites, but interpolation gave higher values and thus a better test of the robustness of the results.

The screening test was then applied. As noted earlier, from this point on it is the same as the attainment test (as described above). The results of the screening test are presented in Table 4-5; results for the 2007 scenarios are given in Table 4-3a followed by the results for the 2009 scenarios in Table 4-5b.

**Table 4-5a. Estimated Design Values for the Screening Test Pseudo Sites for the 2007 Baseline and 2007 Port Site Interim Growth Scenario. The 2002 Interpolated Weighted-Average Design Values for the Pseudo Sites Are Also Listed.**

| Monitoring Site | Estimated Design Value (ppb) | | |
|---|---|---|---|
| | 2002 Interpolated Weighted-Average DV | 2007 Baseline | 2007 Port Site Interim Growth Scenario |
| Pseudosite #1 | 88.1 | 83 | 83 |
| Pseudosite #2 | 86.4 | 78 | 78 |
| Pseudosite #3 | 85.5 | 78 | 78 |

**Table 4-5b.**
**Estimated Design Values for the Screening Test Pseudo Sites for the 2009 Baseline, 2009 Supersite and Port Site Growth Scenario, 2009 Supersite and Port Site Scenario with CAIR, and the Expanded Growth Scenario with CAIR.**

| Monitoring Site | Estimated Design Value (ppb) | | | |
|---|---|---|---|---|
| | 2009 Baseline | 2009 Supersite & Port Site Growth Scenario | 2009 Supersite & Port Site Growth Scenario w/CAIR | 2009 Expanded Supersite & Port Site Growth Scenario w/CAIR |
| Pseudosite #1 | 81 | 82 | 82 | 82 |
| Pseudosite #2 | 76 | 77 | 77 | 77 |
| Pseudosite #3 | 77 | 78 | 77 | 78 |

These results confirm that for locations throughout the non-attainment counties and adjacent areas that have simulated values greater than those near monitors, future-year estimated design values are expected to be less than 84 ppb for all scenarios.

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# 5. Summary

This report presents the methods and results of an ozone air quality modeling study for Crittenden County, Arkansas that was designed to assess potential future-year ozone air quality impacts from hypothetical industrial facilities that may be located in the proposed Crittenden County Economic Development Zone (EDZ). In conducting the modeling to support the EDZ assessment for Crittenden County analysis, we used the modeling databases developed for the Arkansas-Tennessee-Mississippi Ozone Study (ATMOS) Early Action Compact (EAC) regional ozone modeling analysis and the Little Rock Ozone Flex modeling analysis.

To support the EDZ assessment, the UAM-V photochemical modeling system was applied for a current year of 2002, two future years of 2007 and 2009, and a variety of future-year emission scenarios. One emissions scenario focused on 2007 and examined the effects of interim growth in Crittenden County to support EDZ development. Three emission scenarios were simulated for 2009, representing different combinations of local growth and national-scale control scenarios. It is expected that 2009 is the first year that any new, large proposed facility in Crittenden County could be fully operational.

For 2007, anthropogenic $NO_x$ emissions for Crittenden County are expected to be lower than the 2002 baseline values by approximately 7.5 percent and anthropogenic VOC emission are expected to be lower by 17.5 percent. Similar reductions are expected throughout the Memphis area. Based on these emission reductions, the modeling results show large reductions in ozone concentrations (and especially concentrations greater than 85 ppb) for 2007. Based on an application of the modeled attainment test, the simulation results also indicate that all sites in the Memphis area will be in attainment of the 8-hour ozone standard by 2007, with a maximum 8-hour ozone design value of 84 ppb for the Marion monitoring site in Crittenden County.

Interim growth at a Port Site location in 2007 results in an increase in calculated 8-hour ozone exceedance exposure for Crittenden County of 2.7 percent. The greatest increase in 8-hour ozone in the vicinity of any site is near the Marion site and is 1 ppb. The design value for all sites is unchanged from the 2007 baseline value and thus simulated attainment for 2007 is not affected by the additional emissions.

For 2009, anthropogenic $NO_x$ emissions for Crittenden County are expected to be lower than the 2002 baseline values by approximately 9.5 percent and anthropogenic VOC emission are expected to be lower by 19.5 percent. As for 2007, similar reductions are expected throughout the Memphis area. The modeling results show large reductions in ozone concentrations and indicate continued attainment of the 8-hour ozone standard throughout the Memphis area in 2009. For this later year, the estimated maximum 8-hour ozone design value is 83 ppb (for the Marion monitoring site in Crittenden County).

The addition of emissions at both the Supersite and the Port Site for 2009 increases calculated 8-hour ozone exceedance exposure for Crittenden County by 6 percent. The greatest increase in 8-hour ozone in the vicinity of any site is near the Marion site and is 1.6 ppb. The estimated design value for the Edmund Orgill Park site is increased by 1 ppb, while that for the other three sites is not changed from the 2009 baseline value. The EDV remains less than 84 ppb for all four sites. Consequently, for this scenario, simulated attainment for 2009 is not affected by the additional emissions.

The conclusion of this analysis is that the addition of the amount and type of emissions that would be expected from a new facility and the growth associated with that facility results in both increases and decreases in ozone concentrations. The additional emissions generally increase the tendency for 8-hour exceedance concentrations but do not impede progress toward attainment, as indicated by the modeled attainment test.

Two additional simulations were run to examine the robustness of this finding, as related to the future-year estimated design value. The incorporation of emissions reductions that are expected to accompany the Clean Air Interstate Rule (CAIR) in 2009 lowers the simulated ozone concentrations slightly, thus providing an additional buffer for the modeled attainment test. An expanded growth scenario increases the source/infrastructure emissions by a significant amount and was conducted as a bounding calculation. For this scenario, the estimated design values are increased slightly for this scenario, but are still less than or equal to 84 ppb.

# 6. References


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# Appendix A

## Comparison of Changes to the Emissions Inventories Between the ATMOS EAC and Crittenden County EDZ Modeling

This section provides information related to the changes that were made to the base case and future year emissions inventories between the modeling completed for the ATMOS Early Action Compact (EAC) at the end of 2004, as summarized in the document "Early Action Compact Ozone Modeling Analysis for the State of Tennessee – Addendum to the Technical Support Document" (SAI, 2004), and the modeling conducted for the Crittenden County EDZ modeling analysis. For the EDZ modeling analysis, the intent was to utilize available modeling episodes and input databases and to update the EAC inventories with the latest available input data and/or emissions estimation tools. As such, we've utilized new inventory information prepared by the states for 2002 (as compiled by VISTAS for the regional haze modeling analysis) to prepare a 2002 current year inventory. For the future year inventories, we've also utilized new economic projection factors (EGAS5.0) as well as the most current version (at the time) of EPA's draft NONROAD2004 model.

Table A-1 provides a summary comparison of the sources of data and/or emission estimation tools used in preparing the 2001 current year modeling inventory for the ATMOS EAC modeling and the 2002 current year modeling inventory for the Crittenden County EDZ modeling.

Table A-2 provides a summary comparison of the sources of data used in preparing the 2007 future year modeling inventory for the ATMOS EAC modeling and the 2007 inventory for the Crittenden County EDZ modeling. For the EAC modeling analysis, no inventories were prepared for 2009, so it is not possible to provide a comparison with the EDZ inventory.

For a comparison of actual changes in emission totals between the EAC and EDZ modeling exercises, component summary totals are provided for all episode days comparing both the current year and future year inventory estimates for Grid 3 and the Memphis MSA. Table A-3 presents component emission totals for Grid 3 comparing EAC estimates and EDZ estimates for the current year modeling inventories. For the EAC modeling, the current year is 2001 and for the EDZ modeling, the current year is 2002. Table A-4 presents this same information for the Memphis MSA (Shelby, Crittenden, DeSoto, Tipton, and Fayette Counties).

An examination of Table A-3 for Grid 3 indicates that current year NOx, VOC, and CO emissions overall are lower (by less than 10%) for the EDZ inventories compared to the EAC inventories. When only anthropogenic VOC emissions are considered, the differences are larger and the EDZ emissions are on the order of 10 to 15% lower. The differences are likely due to differences in years (2001 vs. 2002), slight changes in MOBILE6, differences in the origin and age of the data (NEI99 vs. NEI2002, as used for the VISTAS typical year emissions), and differences in the versions of the NONROAD models used. The largest differences for the anthropogenic VOC emissions are for the area source category and this is due to the use of different base emission inventories (NEI99 vs. NEI2002). Similarly, emissions for the Memphis EAC (Table A-4) are also lower for the EDZ inventories, but by a slightly larger percentage for NOx and VOC for most simulation days. The reasons given above account for the differences.

Table A-5 presents component emission totals for Grid 3 comparing EAC estimates and EDZ estimates for the 2007 future year modeling inventory. Table A-6 presents this same information for the Memphis MSA. An examination of Table A-5 for Grid 3 indicates that future year NOx, VOC, and CO emissions for 2007 are lower by approximately (5 to 10%) for the EDZ inventories compared to the EAC inventories. Again the percentage difference is larger for anthropogenic VOC only. The differences area attributable to differences in origin and year of the base year information (2001 vs. 2002) from which the projections were made, the use of EGAS vs. BEA projection factors, slight changes in MOBILE6, and differences in the versions of the NONROAD models used. Emissions for the Memphis EAC (Table A-6) are also lower for the EDZ inventories for these same reasons, as well as small differences in the local control measures assumed for the EAC vs. the EDZ modeling.

**Table A-1. Emissions Data Sources for the EDZ and ATMOS EAC Current-Year Emission Inventories.**

Point Source

| State/Facility | EAC (2001) | EDZ (2002) |
|---|---|---|
| State of Alabama | NEI99 Version 2 | State provided data |
| State of Arkansas | NEI99 Version 2 | State provided data |
| State of Florida | NEI99 Version 2 | State provided data |
| State of Georgia | NEI99 Version 2 | State provided data |
| State of Mississippi | State provided data | State provided data |
| State of Louisiana | NEI99 Version 2 | State provided data |
| State of Tennessee | State provided data | VISTAS revised 2002 Phase II typical year data |
| State of Texas | State provided data | VISTAS revised 2002 Phase II typical year data |
| Other States | NEI99 Version 2 | VISTAS revised 2002 Phase II typical year data |
| Southern Company | Episode-specific data for June | Episode-specific data for May, July & September |
| TVA | Episode-specific data for June | VISTAS CEM-based 2002 data |
| Entergy | Episode-specific data for June for Independence, White Bluff and Nelson | VISTAS CEM-based 2002 data for all facilities |
| Gas Compressors in TN | Facility-specific data | VISTAS revised 2002 Phase II typical year data |

Area Source

| State | EAC (2001) | EDZ (2002) |
|---|---|---|
| Davidson County, Tennessee | County provided data | VISTAS revised 2002 Phase II typical year data |
| Four counties in Arkansas | State provided data | VISTAS revised 2002 Phase II typical year data |
| State of Texas | State provided data | VISTAS revised 2002 Phase II typical year data |
| Other States | NEI99 Version 2 | VISTAS revised 2002 Phase II typical year data |

**Table A-1.** *(continued)*

Nonroad Source: Aircraft, Railroad and Commercial Marine Vessels

| State | EAC (2001) | EDZ (2002) |
|---|---|---|
| Four counties in Arkansas | State provided data | VISTAS revised 2002 Phase II typical year data |
| State of Texas | State provided data | VISTAS revised 2002 Phase II typical year data |
| Other States/Counties | NEI99 Version 2 | VISTAS revised 2002 Phase II typical year data |

Nonroad Source: Other Source Categories

| State | EAC (2001) | EDZ (2002) |
|---|---|---|
| Four counties in Arkansas | State provided data | Draft NONROAD2004 |
| State of Texas | State provided data | Draft NONROAD2004 |
| Other States/Counties | EPA NONROAD2002a | Draft NONROAD2004 |

Mobile Source

| State | EAC (2001) | EDZ (2002) |
|---|---|---|
| State of Alabama | MOBILE6.2 (Oct 2002) and state provided 2001 VMT | MOBILE6.2.3 and state provided 2002 VMT |
| State of Arkansas | MOBILE6.2 (Oct 2002) and state provided 2001 VMT | MOBILE6.2.3 and state provided 2002 VMT |
| State of Florida | MOBILE6.2 (Oct 2002) and state provided 2001 VMT | MOBILE6.2.3 and VISTAS revised 2002 Phase II VMT |
| State of Georgia | MOBILE6.2 (Oct 2002) and state provided 2001 VMT | MOBILE6.2.3 and VISTAS revised 2002 Phase II VMT |
| State of Mississippi | MOBILE6.2 (Oct 2002) and state provided 2001 VMT | MOBILE6.2.3 and state provided 2002 VMT |
| State of Louisiana | MOBILE6.2 (Oct 2002) and state provided 2001 VMT | MOBILE6.2.3 and state provided 2002 VMT |
| State of South Carolina | MOBILE6.2 (Oct 2002) and state provided 2001 VMT | MOBILE6.2.3 and VISTAS revised 2002 Phase II VMT |
| State of North Carolina | MOBILE6.2 (Oct 2002) and state provided 2001 VMT | MOBILE6.2.3 and VISTAS revised 2002 Phase II VMT |
| State of Tennessee | MOBILE6.2 (Oct 2002) and state provided 2001 VMT | MOBILE6.2.3 and VISTAS revised 2002 Phase II VMT |
| State of Texas | MOBILE6.2 (Oct 2002) and state provided 2001 VMT | MOBILE6.2.3 and VISTAS revised 2002 Phase II VMT |
| Other States | MOBILE6.2 (Oct 2002) and FHWA 2000 VMT | MOBILE6.2.3 and VISTAS revised 2002 Phase II VMT |

**Table A-2. Emissions Data Sources for the EDZ and ATMOS EAC 2007 Baseline Emission Inventories.**

Point Source

| State/Facility | EAC | EDZ |
|---|---|---|
| Projections Based on | 2001 Current-year data | 2002 Current-year data |
| Projection Factors | BEA state-specific GSP factors for all states (except Louisiana, where employment factors were used) | State-specific EGAS 5.0 projection factors for all states |
| Control Factors | The same set of controls factors applied for EAC and EDZ inventories | The same set of controls factors applied for EAC and EDZ inventories |
| EAC Control Measures | ATMOS EAC AS-8 | ATMOS EAC AS-8 plus additional controls for Shelby and De Soto Counties |
| Southern Company | The same 2007 emissions estimates used for EAC and EDZ inventories | The same 2007 emissions estimates used for EAC and EDZ inventories |
| TVA | The same 2007 emissions estimates used for EAC and EDZ inventories | The same 2007 emissions estimates used for EAC and EDZ inventories |
| Entergy | Kept emissions at current-year level | Kept emissions at current-year level |
| State of Texas | The same 2007 emissions estimates used for EAC and EDZ inventories | The same 2007 emissions estimates used for EAC and EDZ inventories |

Area Source

| State | EAC | EDZ |
|---|---|---|
| Projections Based on | 2001 Current-year data | 2002 Current-year data |
| Projection Factors | BEA state-specific GSP factors for all states (except Louisiana, where employment factors were used) | State-specific EGAS 5.0 projection factors for all states |
| Control Factors | The same set of controls factors applied for EAC and EDZ inventories | The same set of controls factors applied for EAC and EDZ inventories |
| EAC Control Measures | ATMOS EAC AS-8 | ATMOS EAC AS-8 plus additional controls for Crittenden and De Soto Counties* |
| State of Texas | The same 2007 emissions estimates used for EAC and EDZ inventories | The same 2007 emissions estimates used for EAC and EDZ inventories |

**Table A-2.** *(continued)*

| Nonroad Source: Aircraft, Railroad and Commercial Marine Vessels | | |
|---|---|---|
| State | EAC | EDZ |
| Projections Based on | 2001 Current-year data | 2002 Current-year data |
| Projection Factors | BEA state-specific GSP factors for all states (except Louisiana, where employment factors were used) | State-specific EGAS 5.0 projection factors for all states |
| EAC Control Measures | ATMOS EAC AS-8 | ATMOS EAC AS-8 plus additional controls for Crittenden County |
| State of Texas | The same 2007 emissions estimates used for EAC and EDZ inventories | The same 2007 emissions estimates used for EAC and EDZ inventories |

| Nonroad Source: Other Source Categories | | |
|---|---|---|
| State | EAC | EDZ |
| Four counties in Arkansas | Applied projections on current-year data | Draft NONROAD2004 |
| State of Texas | The same 2007 emissions estimates used for EAC and EDZ inventories | The same 2007 emissions estimates used for EAC and EDZ inventories |
| Other States/Counties | EPA NONROAD2002a | Draft NONROAD2004 |

**Table A-2.** *(continued)*

Mobile Source

| State | EAC | EDZ |
|---|---|---|
| State of Alabama | MOBILE6.2 (Oct 2002) and state provided 2007 VMT | MOBILE6.2.3 and state provided 2007 VMT |
| State of Arkansas | MOBILE6.2 (Oct 2002) and state provided 2007 VMT | MOBILE6.2.3 and state provided 2007 VMT |
| State of Florida | MOBILE6.2 (Oct 2002) and state provided 2007 VMT | MOBILE6.2.3 and state provided 2007 VMT |
| State of Georgia | MOBILE6.2 (Oct 2002) and state provided 2007 VMT | MOBILE6.2.3 and state provided 2007 VMT |
| State of Mississippi | MOBILE6.2 (Oct 2002) and state provided 2007 VMT | MOBILE6.2.3 and state provided 2007 VMT |
| State of Louisiana | MOBILE6.2 (Oct 2002) and state provided 2007 VMT | MOBILE6.2.3 and state provided 2007 VMT |
| State of South Carolina | MOBILE6.2 (Oct 2002) and state provided 2007 VMT | MOBILE6.2.3 and state provided 2007 VMT |
| State of North Carolina | MOBILE6.2 (Oct 2002) and state provided 2007 VMT | MOBILE6.2.3 and state provided 2007 VMT |
| State of Tennessee | MOBILE6.2 (Oct 2002) and state provided 2007 VMT | MOBILE6.2.3 and state provided 2007 VMT |
| State of Texas | MOBILE6.2 (Oct 2002) and state provided 2007 VMT | MOBILE6.2.3 and state provided 2007 VMT |
| Other States | MOBILE6.2 (Oct 2002) and FHWA 2007 VMT | MOBILE6.2.3 and FHWA 2007 VMT |
| | | |
| EAC Control Measures | ATMOS EAC AS-8 | ATMOS EAC AS-8<br>plus additional controls for Shelby and Crittenden Counties* |

* Additional EAC control measures applied to Shelby, Crittenden and De Soto Counties:

- **Shelby County**
  - Mobile source: NOx reductions from 10 mph speed limit
  - Point source: applied NOx Ract controls; set emissions to zero for 5 facilities; and applied emissions reductions for 5 facilities
- **Crittenden County**
  - Additional controls for area, nonroad and onroad mobile sources
- **De Soto County**
  - Point source: NOx reductions for Texas Gas
  - Area source: applied reductions due to open burning restrictions.

**Table A-3a. Comparison of Daily Emissions Totals by Source Category for the Current-Year Emission Inventory for Grid 3: August/September 1999 Simulation Period.**

EDZ 2002 Current-Year Emissions Summary for Grid 3: August/September 1999 Episode

| NOX | 020829 | 020830 | 020831 | 020901 | 020902 | 020903 | 020904 | 020905 | 020906 | 020907 | 020908 | 020909 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Area | 275 | 298 | 298 | 298 | 298 | 298 | 282 | 275 | 275 | 298 | 298 | 298 |
| Motor vehicle | 1704 | 2049 | 2090 | 2070 | 2110 | 2252 | 1948 | 1704 | 1704 | 2090 | 2070 | 2110 |
| Non-road | 709 | 900 | 900 | 900 | 900 | 900 | 709 | 709 | 709 | 900 | 900 | 900 |
| Low-level point | 80 | 78 | 76 | 75 | 76 | 87 | 75 | 82 | 82 | 79 | 77 | 86 |
| Biogenic | 378 | 336 | 314 | 353 | 377 | 375 | 362 | 363 | 358 | 346 | 327 | 306 |
| All low-level | 3146 | 3660 | 3677 | 3694 | 3760 | 3912 | 3378 | 3133 | 3128 | 3712 | 3671 | 3700 |
| Elevated point | 1592 | 1643 | 1666 | 1695 | 1688 | 1628 | 1616 | 1601 | 1618 | 1666 | 1695 | 1688 |
| Total Anthropogenic | 4360 | 4967 | 5029 | 5036 | 5071 | 5165 | 4631 | 4371 | 4389 | 5033 | 5039 | 5082 |
| TOTAL | 4738 | 5303 | 5344 | 5389 | 5448 | 5540 | 4993 | 4734 | 4746 | 5379 | 5365 | 5388 |
| VOC | 020829 | 020830 | 020831 | 020901 | 020902 | 020903 | 020904 | 020905 | 020906 | 020907 | 020908 | 020909 |
| Area | 2066 | 2067 | 2067 | 2067 | 2067 | 2067 | 2066 | 2066 | 2066 | 2067 | 2067 | 2067 |
| Motor vehicle | 1009 | 1214 | 1238 | 1226 | 1250 | 1334 | 1154 | 1009 | 1009 | 1238 | 1226 | 1250 |
| Non-road | 605 | 396 | 396 | 396 | 396 | 396 | 605 | 605 | 605 | 396 | 396 | 396 |
| Low-level point | 344 | 435 | 432 | 430 | 431 | 456 | 395 | 349 | 349 | 438 | 434 | 455 |
| Biogenic | 33636 | 25595 | 21501 | 26083 | 28484 | 28505 | 29671 | 24904 | 25682 | 25391 | 24251 | 16207 |
| All low-level | 37660 | 29707 | 25634 | 30202 | 32628 | 32758 | 33890 | 28933 | 29711 | 29529 | 28373 | 20374 |
| Elevated point | 114 | 122 | 122 | 123 | 122 | 122 | 115 | 113 | 114 | 122 | 123 | 122 |
| Total Anthropogenic | 4138 | 4234 | 4255 | 4241 | 4266 | 4375 | 4335 | 4142 | 4142 | 4261 | 4245 | 4290 |
| TOTAL | 37773 | 29829 | 25756 | 30325 | 32750 | 32880 | 34006 | 29046 | 29825 | 29652 | 28495 | 20496 |
| CO | 020829 | 020830 | 020831 | 020901 | 020902 | 020903 | 020904 | 020905 | 020906 | 020907 | 020908 | 020909 |
| Area | 1999 | 2011 | 2011 | 2011 | 2011 | 2011 | 2003 | 1999 | 1999 | 2011 | 2011 | 2011 |
| Motor vehicle | 10938 | 13151 | 13412 | 13282 | 13542 | 14454 | 12500 | 10938 | 10938 | 13412 | 13282 | 13542 |
| Non-road | 4965 | 4901 | 4901 | 4901 | 4901 | 4901 | 4965 | 4965 | 4965 | 4901 | 4901 | 4901 |
| Low-level point | 708 | 333 | 264 | 231 | 258 | 769 | 445 | 829 | 815 | 406 | 328 | 754 |
| All low-level | 18610 | 20396 | 20588 | 20425 | 20711 | 22134 | 19913 | 18730 | 18716 | 20729 | 20521 | 21207 |
| Elevated point | 780 | 814 | 818 | 820 | 819 | 817 | 784 | 781 | 785 | 818 | 820 | 819 |
| Total Anthropogenic | 19390 | 21211 | 21405 | 21245 | 21530 | 22951 | 20698 | 19511 | 19501 | 21547 | 21341 | 22026 |
| TOTAL | 19390 | 21211 | 21405 | 21245 | 21530 | 22951 | 20698 | 19511 | 19501 | 21547 | 21341 | 22026 |

## **Table A-3a.** *(continued)*

EAC 2001 Current-Year Emissions Summary for Grid 3: August/September 1999 Episode

| NOX | 010829 | 010830 | 010831 | 010901 | 010902 | 010903 | 010904 | 010905 | 010906 | 010907 | 010908 | 010909 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Area | 269 | 293 | 293 | 293 | 293 | 293 | 277 | 269 | 269 | 293 | 293 | 293 |
| Motor vehicle | 1718 | 2066 | 2107 | 2087 | 2127 | 2271 | 1964 | 1718 | 1718 | 2107 | 2087 | 2127 |
| Non-road | 673 | 874 | 874 | 874 | 874 | 874 | 673 | 673 | 673 | 874 | 874 | 874 |
| Low-level point | 126 | 139 | 139 | 139 | 139 | 139 | 130 | 126 | 126 | 139 | 139 | 139 |
| Biogenic | 378 | 336 | 314 | 353 | 377 | 375 | 362 | 363 | 358 | 346 | 327 | 306 |
| All low-level | 3163 | 3707 | 3727 | 3744 | 3810 | 3951 | 3406 | 3148 | 3143 | 3758 | 3719 | 3738 |
| Elevated point | 1783 | 1926 | 1936 | 1910 | 1920 | 1885 | 1860 | 1783 | 1783 | 1936 | 1910 | 1920 |
| Total Anthropogenic | 4568 | 5297 | 5349 | 5302 | 5353 | 5461 | 4903 | 4568 | 4568 | 5349 | 5302 | 5353 |
| TOTAL | 4946 | 5633 | 5663 | 5655 | 5730 | 5836 | 5266 | 4931 | 4926 | 5694 | 5629 | 5658 |
| VOC | 010829 | 010830 | 010831 | 010901 | 010902 | 010903 | 010904 | 010905 | 010906 | 010907 | 010908 | 010909 |
| Area | 2252 | 2253 | 2253 | 2253 | 2253 | 2253 | 2253 | 2252 | 2252 | 2253 | 2253 | 2253 |
| Motor vehicle | 1042 | 1253 | 1278 | 1266 | 1291 | 1377 | 1191 | 1042 | 1042 | 1278 | 1266 | 1291 |
| Non-road | 640 | 412 | 412 | 412 | 412 | 412 | 640 | 640 | 640 | 412 | 412 | 412 |
| Low-level point | 314 | 498 | 498 | 498 | 498 | 498 | 359 | 314 | 314 | 498 | 498 | 498 |
| Biogenic | 33636 | 25595 | 21501 | 26083 | 28484 | 28505 | 29671 | 24904 | 25682 | 25391 | 24251 | 16207 |
| All low-level | 37884 | 30012 | 25943 | 30513 | 32938 | 33046 | 34113 | 29153 | 29931 | 29833 | 28680 | 20661 |
| Elevated point | 118 | 145 | 145 | 145 | 145 | 145 | 121 | 118 | 118 | 145 | 145 | 145 |
| Total Anthropogenic | 4366 | 4562 | 4587 | 4574 | 4599 | 4686 | 4564 | 4366 | 4366 | 4587 | 4574 | 4599 |
| TOTAL | 38002 | 30157 | 26088 | 30657 | 33083 | 33191 | 34234 | 29270 | 30048 | 29978 | 28825 | 20806 |
| CO | 010829 | 010830 | 010831 | 010901 | 010902 | 010903 | 010904 | 010905 | 010906 | 010907 | 010908 | 010909 |
| Area | 2302 | 2309 | 2309 | 2309 | 2309 | 2309 | 2304 | 2302 | 2302 | 2309 | 2309 | 2309 |
| Motor vehicle | 11283 | 13566 | 13835 | 13701 | 13969 | 14909 | 12895 | 11283 | 11283 | 13835 | 13701 | 13969 |
| Non-road | 5030 | 4932 | 4932 | 4932 | 4932 | 4932 | 5030 | 5030 | 5030 | 4932 | 4932 | 4932 |
| Low-level point | 195 | 213 | 213 | 213 | 213 | 213 | 203 | 195 | 195 | 213 | 213 | 213 |
| All low-level | 18810 | 21021 | 21289 | 21155 | 21424 | 22364 | 20433 | 18810 | 18810 | 21289 | 21155 | 21424 |
| Elevated point | 795 | 854 | 854 | 853 | 854 | 852 | 803 | 795 | 795 | 854 | 853 | 854 |
| Total Anthropogenic | 19605 | 21875 | 22143 | 22008 | 22278 | 23216 | 21236 | 19605 | 19605 | 22143 | 22008 | 22278 |
| TOTAL | 19605 | 21875 | 22143 | 22008 | 22278 | 23216 | 21236 | 19605 | 19605 | 22143 | 22008 | 22278 |

**Table A-3b. Comparison of Daily Emissions Totals by Source Category for the Current-Year Emission Inventory for Grid 3: June 2001 Simulation Period.**

EDZ 2002 Current-Year Emissions Summary for Grid 3: June 2001 Episode

| NOX | 020616 | 020617 | 020618 | 020619 | 020620 | 020621 | 020622 |
|---|---|---|---|---|---|---|---|
| Area | 258 | 251 | 272 | 272 | 272 | 272 | 272 |
| Motor vehicle | 1949 | 1705 | 2051 | 2091 | 2071 | 2111 | 2254 |
| Non-road | 792 | 792 | 1002 | 1002 | 1002 | 1002 | 1002 |
| Low-level point | 71 | 70 | 78 | 74 | 77 | 75 | 78 |
| Biogenic | 350 | 389 | 400 | 391 | 374 | 336 | 307 |
| All low-level | 3419 | 3206 | 3803 | 3830 | 3795 | 3796 | 3913 |
| Elevated point | 1550 | 1497 | 1572 | 1612 | 1623 | 1620 | 1577 |
| Total Anthropogenic | 4619 | 4315 | 4975 | 5052 | 5044 | 5080 | 5183 |
| TOTAL | 4969 | 4703 | 5375 | 5443 | 5418 | 5416 | 5491 |
| VOC | 020616 | 020617 | 020618 | 020619 | 020620 | 020621 | 020622 |
| Area | 1748 | 1748 | 1749 | 1749 | 1749 | 1749 | 1749 |
| Motor vehicle | 1172 | 1026 | 1233 | 1258 | 1246 | 1270 | 1356 |
| Non-road | 984 | 984 | 514 | 514 | 514 | 514 | 514 |
| Low-level point | 388 | 327 | 443 | 431 | 438 | 434 | 440 |
| Biogenic | 32242 | 38969 | 39530 | 33605 | 31571 | 24887 | 16452 |
| All low-level | 36534 | 43054 | 43469 | 37557 | 35517 | 28854 | 20511 |
| Elevated point | 114 | 112 | 121 | 121 | 121 | 121 | 121 |
| Total Anthropogenic | 4406 | 4197 | 4061 | 4073 | 4068 | 4088 | 4179 |
| TOTAL | 36648 | 43166 | 43590 | 37678 | 35638 | 28975 | 20632 |
| CO | 020616 | 020617 | 020618 | 020619 | 020620 | 020621 | 020622 |
| Area | 1109 | 1106 | 1117 | 1117 | 1117 | 1117 | 1117 |
| Motor vehicle | 12643 | 11062 | 13301 | 13564 | 13433 | 13696 | 14618 |
| Non-road | 6650 | 6650 | 5727 | 5727 | 5727 | 5727 | 5727 |
| Low-level point | 270 | 329 | 438 | 237 | 344 | 269 | 418 |
| All low-level | 20671 | 19146 | 20583 | 20646 | 20621 | 20809 | 21880 |
| Elevated point | 779 | 775 | 813 | 816 | 816 | 816 | 814 |
| Total Anthropogenic | 21451 | 19922 | 21396 | 21462 | 21438 | 21625 | 22694 |
| TOTAL | 21451 | 19922 | 21396 | 21462 | 21438 | 21625 | 22694 |

## **Table A-3b.** *(continued)*

EAC 2001 Current-Year Emissions Summary for Grid 3: June 2001 Episode

| NOX | 010616 | 010617 | 010618 | 010619 | 010620 | 010621 | 010622 |
|---|---|---|---|---|---|---|---|
| Area | 277 | 269 | 293 | 293 | 293 | 293 | 293 |
| Motor vehicle | 1960 | 1715 | 2062 | 2103 | 2082 | 2123 | 2266 |
| Non-road | 747 | 747 | 974 | 974 | 974 | 974 | 974 |
| Low-level point | 132 | 129 | 142 | 142 | 142 | 142 | 142 |
| Biogenic | 350 | 389 | 400 | 391 | 374 | 336 | 307 |
| All low-level | 3465 | 3247 | 3871 | 3903 | 3865 | 3868 | 3983 |
| Elevated point | 1929 | 1852 | 1996 | 2006 | 1980 | 1990 | 1955 |
| Total Anthropogenic | 5045 | 4711 | 5467 | 5518 | 5471 | 5522 | 5630 |
| TOTAL | 5395 | 5099 | 5867 | 5909 | 5845 | 5858 | 5938 |
| VOC | 010616 | 010617 | 010618 | 010619 | 010620 | 010621 | 010622 |
| Area | 2253 | 2252 | 2253 | 2253 | 2253 | 2253 | 2253 |
| Motor vehicle | 1215 | 1063 | 1279 | 1304 | 1291 | 1317 | 1405 |
| Non-road | 1023 | 1023 | 530 | 530 | 530 | 530 | 530 |
| Low-level point | 364 | 319 | 503 | 503 | 503 | 503 | 503 |
| Biogenic | 32242 | 38969 | 39530 | 33605 | 31571 | 24887 | 16452 |
| All low-level | 37096 | 43626 | 44094 | 38195 | 36148 | 29489 | 21143 |
| Elevated point | 122 | 118 | 137 | 137 | 137 | 137 | 137 |
| Total Anthropogenic | 4976 | 4775 | 4701 | 4727 | 4714 | 4739 | 4828 |
| TOTAL | 37217 | 43744 | 44231 | 38331 | 36285 | 29626 | 21280 |
| CO | 010616 | 010617 | 010618 | 010619 | 010620 | 010621 | 010622 |
| Area | 2304 | 2302 | 2309 | 2309 | 2309 | 2309 | 2309 |
| Motor vehicle | 13089 | 11453 | 13770 | 14043 | 13907 | 14179 | 15134 |
| Non-road | 6651 | 6651 | 5729 | 5729 | 5729 | 5729 | 5729 |
| Low-level point | 200 | 191 | 211 | 211 | 211 | 211 | 211 |
| All low-level | 22243 | 20596 | 22020 | 22293 | 22156 | 22429 | 23383 |
| Elevated point | 802 | 794 | 848 | 848 | 847 | 848 | 846 |
| Total Anthropogenic | 23045 | 21390 | 22868 | 23140 | 23003 | 23277 | 24230 |
| TOTAL | 23045 | 21390 | 22868 | 23140 | 23003 | 23277 | 24230 |

**Table A-3c. Comparison of Daily Emissions Totals by Source Category for the Current-Year Emission Inventory for Grid 3: July 2002 Simulation Period.**

EDZ 2002 Current-Year Emissions Summary for Grid 3: July 2002 Episode

| NOX | 020704 | 020705 | 020706 | 020707 | 020708 | 020709 | 020710 |
|---|---|---|---|---|---|---|---|
| Area | 251 | 272 | 258 | 251 | 272 | 272 | 272 |
| Motor vehicle | 1681 | 2222 | 1921 | 1681 | 2022 | 2062 | 2042 |
| Non-road | 779 | 982 | 779 | 779 | 982 | 982 | 982 |
| Low-level point | 68 | 75 | 71 | 68 | 79 | 75 | 76 |
| Biogenic | 426 | 444 | 438 | 410 | 423 | 438 | 438 |
| All low-level | 3205 | 3995 | 3467 | 3188 | 3778 | 3829 | 3809 |
| Elevated point | 1603 | 1591 | 1616 | 1585 | 1692 | 1673 | 1685 |
| Total Anthropogenic | 4382 | 5142 | 4645 | 4363 | 5047 | 5063 | 5057 |
| TOTAL | 4808 | 5586 | 5083 | 4773 | 5470 | 5501 | 5495 |
| VOC | 020704 | 020705 | 020706 | 020707 | 020708 | 020709 | 020710 |
| Area | 1748 | 1749 | 1748 | 1748 | 1749 | 1749 | 1749 |
| Motor vehicle | 1049 | 1386 | 1198 | 1049 | 1261 | 1286 | 1273 |
| Non-road | 959 | 504 | 959 | 959 | 504 | 504 | 504 |
| Low-level point | 322 | 433 | 389 | 320 | 441 | 433 | 434 |
| Biogenic | 32335 | 42509 | 45719 | 40079 | 41123 | 41730 | 38171 |
| All low-level | 36412 | 46581 | 50014 | 44154 | 45078 | 45702 | 42132 |
| Elevated point | 115 | 121 | 115 | 113 | 122 | 122 | 122 |
| Total Anthropogenic | 4192 | 4193 | 4409 | 4189 | 4077 | 4094 | 4083 |
| TOTAL | 36527 | 46702 | 50128 | 44268 | 45200 | 45824 | 42254 |
| CO | 020704 | 020705 | 020706 | 020707 | 020708 | 020709 | 020710 |
| Area | 1106 | 1117 | 1109 | 1106 | 1117 | 1117 | 1117 |
| Motor vehicle | 11260 | 14879 | 12869 | 11260 | 13539 | 13807 | 13673 |
| Non-road | 6496 | 5600 | 6496 | 6496 | 5600 | 5600 | 5600 |
| Low-level point | 235 | 262 | 275 | 200 | 434 | 251 | 278 |
| All low-level | 19097 | 21858 | 20749 | 19062 | 20690 | 20775 | 20668 |
| Elevated point | 787 | 817 | 791 | 788 | 826 | 828 | 830 |
| Total Anthropogenic | 19884 | 22675 | 21540 | 19850 | 21516 | 21604 | 21498 |
| TOTAL | 19884 | 22675 | 21540 | 19850 | 21516 | 21604 | 21498 |

## **Table A-3c.** *(continued)*

EAC 2001 Current-Year Emissions Summary for Grid 3: July 2002 Episode

| NOX | 010704 | 010705 | 010706 | 010707 | 010708 | 010709 | 010710 |
|---|---|---|---|---|---|---|---|
| Area | 269 | 293 | 277 | 269 | 293 | 293 | 293 |
| Motor vehicle | 1690 | 2233 | 1931 | 1690 | 2032 | 2072 | 2052 |
| Non-road | 735 | 955 | 735 | 735 | 955 | 955 | 955 |
| Low-level point | 129 | 142 | 132 | 129 | 142 | 142 | 142 |
| Biogenic | 426 | 444 | 438 | 410 | 423 | 438 | 438 |
| All low-level | 3247 | 4067 | 3513 | 3232 | 3845 | 3900 | 3880 |
| Elevated point | 1852 | 1955 | 1929 | 1852 | 1996 | 2006 | 1980 |
| Total Anthropogenic | 4674 | 5578 | 5004 | 4674 | 5418 | 5468 | 5422 |
| TOTAL | 5099 | 6022 | 5442 | 5084 | 5841 | 5906 | 5860 |
| VOC | 010704 | 010705 | 010706 | 010707 | 010708 | 010709 | 010710 |
| Area | 2252 | 2253 | 2253 | 2252 | 2253 | 2253 | 2253 |
| Motor vehicle | 1088 | 1438 | 1243 | 1088 | 1308 | 1334 | 1321 |
| Non-road | 997 | 519 | 997 | 997 | 519 | 519 | 519 |
| Low-level point | 319 | 503 | 364 | 319 | 503 | 503 | 503 |
| Biogenic | 32335 | 42509 | 45719 | 40079 | 41123 | 41730 | 38171 |
| All low-level | 36991 | 47222 | 50576 | 44735 | 45706 | 46339 | 42768 |
| Elevated point | 118 | 137 | 122 | 118 | 137 | 137 | 137 |
| Total Anthropogenic | 4775 | 4850 | 4979 | 4775 | 4720 | 4746 | 4733 |
| TOTAL | 37109 | 47359 | 50698 | 44854 | 45843 | 46476 | 42904 |
| CO | 010704 | 010705 | 010706 | 010707 | 010708 | 010709 | 010710 |
| Area | 2302 | 2309 | 2304 | 2302 | 2309 | 2309 | 2309 |
| Motor vehicle | 11674 | 15427 | 13342 | 11674 | 14037 | 14315 | 14176 |
| Non-road | 6502 | 5605 | 6502 | 6502 | 5605 | 5605 | 5605 |
| Low-level point | 191 | 211 | 200 | 191 | 211 | 211 | 211 |
| All low-level | 20669 | 23552 | 22348 | 20669 | 22162 | 22440 | 22301 |
| Elevated point | 794 | 846 | 802 | 794 | 848 | 848 | 847 |
| Total Anthropogenic | 21463 | 24398 | 23150 | 21463 | 23010 | 23288 | 23148 |
| TOTAL | 21463 | 24398 | 23150 | 21463 | 23010 | 23288 | 23148 |

**Table A-4a. Comparison of Daily Emissions Totals by Source Category for the Current-Year Emission Inventory for the Memphis Area: August/September 1999 Simulation Period.**

EDZ 2002 Current-Year Emissions Summary for Memphis EAC Area: August/September 1999 Episode

| NOX | 020829 | 020830 | 020831 | 020901 | 020902 | 020903 | 020904 | 020905 | 020906 | 020907 | 020908 | 020909 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Area | 13.0 | 13.8 | 13.8 | 13.8 | 13.8 | 13.8 | 13.3 | 13.0 | 13.0 | 13.8 | 13.8 | 13.8 |
| Motor vehicle | 82.3 | 98.9 | 100.9 | 99.9 | 101.9 | 108.7 | 94.0 | 82.3 | 82.3 | 100.9 | 99.9 | 101.9 |
| Non-road | 79.3 | 91.3 | 91.3 | 91.3 | 91.3 | 91.3 | 79.3 | 79.3 | 79.3 | 91.3 | 91.3 | 91.3 |
| Low-level point | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| Biogenic | 13.2 | 12.2 | 11.8 | 13.0 | 14.2 | 14.1 | 12.9 | 13.2 | 12.6 | 12.0 | 10.4 | 10.6 |
| All low-level | 189.0 | 217.3 | 218.9 | 219.1 | 222.3 | 229.1 | 200.7 | 189.0 | 188.3 | 219.1 | 216.6 | 218.7 |
| Elevated point | 46.9 | 44.5 | 46.1 | 46.6 | 45.8 | 42.1 | 36.4 | 35.0 | 35.6 | 46.1 | 46.6 | 45.8 |
| Total Anthropogenic | 222.7 | 249.7 | 253.2 | 252.8 | 253.9 | 257.0 | 224.2 | 210.8 | 211.3 | 253.2 | 252.8 | 253.9 |
| TOTAL | 235.9 | 261.9 | 265.0 | 265.8 | 268.1 | 271.1 | 237.1 | 224.0 | 223.9 | 265.2 | 263.2 | 264.5 |
| VOC | 020829 | 020830 | 020831 | 020901 | 020902 | 020903 | 020904 | 020905 | 020906 | 020907 | 020908 | 020909 |
| Area | 116.6 | 116.6 | 116.6 | 116.6 | 116.6 | 116.6 | 116.6 | 116.6 | 116.6 | 116.6 | 116.6 | 116.6 |
| Motor vehicle | 44.8 | 53.8 | 54.9 | 54.4 | 55.4 | 59.2 | 51.2 | 44.8 | 44.8 | 54.9 | 54.4 | 55.4 |
| Non-road | 27.7 | 23.3 | 23.3 | 23.3 | 23.3 | 23.3 | 27.7 | 27.7 | 27.7 | 23.3 | 23.3 | 23.3 |
| Low-level point | 13.2 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.3 | 13.2 | 13.2 | 13.4 | 13.4 | 13.4 |
| Biogenic | 474.4 | 374.7 | 396.1 | 457.4 | 536.3 | 522.5 | 387.4 | 406.3 | 320.1 | 352.1 | 110.1 | 272.2 |
| All low-level | 676.5 | 581.9 | 604.3 | 665.1 | 745.0 | 734.9 | 596.1 | 608.4 | 522.2 | 560.3 | 317.7 | 481.0 |
| Elevated point | 4.1 | 4.1 | 4.1 | 4.1 | 4.1 | 4.1 | 4.0 | 4.0 | 4.0 | 4.1 | 4.1 | 4.1 |
| Total Anthropogenic | 206.2 | 211.2 | 212.3 | 211.8 | 212.8 | 216.5 | 212.7 | 206.1 | 206.1 | 212.3 | 211.8 | 212.8 |
| TOTAL | 680.6 | 585.9 | 608.4 | 669.2 | 749.1 | 739.0 | 600.1 | 612.4 | 526.2 | 564.4 | 321.8 | 485.0 |
| CO | 020829 | 020830 | 020831 | 020901 | 020902 | 020903 | 020904 | 020905 | 020906 | 020907 | 020908 | 020909 |
| Area | 86.6 | 86.7 | 86.7 | 86.7 | 86.7 | 86.7 | 86.6 | 86.6 | 86.6 | 86.7 | 86.7 | 86.7 |
| Motor vehicle | 499.6 | 600.8 | 612.6 | 606.7 | 618.6 | 660.2 | 571.0 | 499.6 | 499.6 | 612.6 | 606.7 | 618.6 |
| Non-road | 274.9 | 306.1 | 306.1 | 306.1 | 306.1 | 306.1 | 274.9 | 274.9 | 274.9 | 306.1 | 306.1 | 306.1 |
| Low-level point | 8.3 | 8.3 | 8.3 | 8.3 | 8.3 | 8.3 | 8.3 | 8.3 | 8.3 | 8.3 | 8.3 | 8.3 |
| All low-level | 869.4 | 1001.9 | 1013.8 | 1007.9 | 1019.8 | 1061.4 | 940.8 | 869.4 | 869.4 | 1013.8 | 1007.9 | 1019.8 |
| Elevated point | 6.5 | 6.4 | 6.5 | 6.5 | 6.4 | 6.4 | 6.1 | 6.0 | 6.0 | 6.5 | 6.5 | 6.4 |
| Total Anthropogenic | 875.9 | 1008.3 | 1020.3 | 1014.3 | 1026.2 | 1067.8 | 946.9 | 875.4 | 875.4 | 1020.3 | 1014.3 | 1026.2 |
| TOTAL | 875.9 | 1008.3 | 1020.3 | 1014.3 | 1026.2 | 1067.8 | 946.9 | 875.4 | 875.4 | 1020.3 | 1014.3 | 1026.2 |

## **Table A-4a.** *(continued)*

EAC 2001 Current-Year Emissions Summary for Memphis EAC Area: August/September 1999 Episode

| NOX | 010829 | 010830 | 010831 | 010901 | 010902 | 010903 | 010904 | 010905 | 010906 | 010907 | 010908 | 010909 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Area | 11.6 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 11.9 | 11.6 | 11.6 | 12.5 | 12.5 | 12.5 |
| Motor vehicle | 85.3 | 102.6 | 104.6 | 103.6 | 105.6 | 112.7 | 97.5 | 85.3 | 85.3 | 104.6 | 103.6 | 105.6 |
| Non-road | 67.7 | 80.2 | 80.2 | 80.2 | 80.2 | 80.2 | 67.7 | 67.7 | 67.7 | 80.2 | 80.2 | 80.2 |
| Low-level point | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 |
| Biogenic | 13.2 | 12.2 | 11.8 | 13.0 | 14.2 | 14.1 | 12.9 | 13.2 | 12.6 | 12.0 | 10.4 | 10.6 |
| All low-level | 179.8 | 209.4 | 211.0 | 211.2 | 214.4 | 221.5 | 192.0 | 179.8 | 179.2 | 211.2 | 208.6 | 210.8 |
| Elevated point | 76.9 | 78.5 | 74.2 | 75.1 | 80.7 | 80.7 | 74.7 | 76.9 | 76.9 | 74.2 | 75.1 | 80.7 |
| Total Anthropogenic | 243.5 | 275.7 | 273.5 | 273.3 | 280.9 | 288.0 | 253.7 | 243.5 | 243.5 | 273.5 | 273.3 | 280.9 |
| TOTAL | 256.7 | 287.8 | 285.2 | 286.3 | 295.1 | 302.1 | 266.6 | 256.7 | 256.1 | 285.4 | 283.7 | 291.5 |
| VOC | 010829 | 010830 | 010831 | 010901 | 010902 | 010903 | 010904 | 010905 | 010906 | 010907 | 010908 | 010909 |
| Area | 152.6 | 152.6 | 152.6 | 152.6 | 152.6 | 152.6 | 152.6 | 152.6 | 152.6 | 152.6 | 152.6 | 152.6 |
| Motor vehicle | 46.9 | 56.4 | 57.5 | 57.0 | 58.1 | 62.0 | 53.6 | 46.9 | 46.9 | 57.5 | 57.0 | 58.1 |
| Non-road | 27.4 | 23.1 | 23.1 | 23.1 | 23.1 | 23.1 | 27.4 | 27.4 | 27.4 | 23.1 | 23.1 | 23.1 |
| Low-level point | 11.7 | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 | 11.8 | 11.7 | 11.7 | 14.5 | 14.5 | 14.5 |
| Biogenic | 474.4 | 374.7 | 396.1 | 457.4 | 536.3 | 522.5 | 387.4 | 406.3 | 320.1 | 352.1 | 110.1 | 272.2 |
| All low-level | 712.9 | 621.3 | 643.7 | 704.5 | 784.5 | 774.6 | 632.7 | 644.8 | 558.6 | 599.7 | 357.1 | 520.4 |
| Elevated point | 4.1 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.1 | 4.1 | 4.1 | 4.6 | 4.6 | 4.6 |
| Total Anthropogenic | 242.6 | 251.1 | 252.2 | 251.6 | 252.7 | 256.7 | 249.4 | 242.6 | 242.6 | 252.2 | 251.6 | 252.7 |
| TOTAL | 717.0 | 625.8 | 648.3 | 709.1 | 789.0 | 779.1 | 636.8 | 648.9 | 562.7 | 604.3 | 361.7 | 525.0 |
| CO | 010829 | 010830 | 010831 | 010901 | 010902 | 010903 | 010904 | 010905 | 010906 | 010907 | 010908 | 010909 |
| Area | 52.2 | 52.3 | 52.3 | 52.3 | 52.3 | 52.3 | 52.2 | 52.2 | 52.2 | 52.3 | 52.3 | 52.3 |
| Motor vehicle | 521.8 | 627.4 | 639.8 | 633.6 | 646.0 | 689.5 | 596.3 | 521.8 | 521.8 | 639.8 | 633.6 | 646.0 |
| Non-road | 267.8 | 301.7 | 301.7 | 301.7 | 301.7 | 301.7 | 267.8 | 267.8 | 267.8 | 301.7 | 301.7 | 301.7 |
| Low-level point | 8.8 | 8.9 | 8.9 | 8.9 | 8.9 | 8.9 | 8.8 | 8.8 | 8.8 | 8.9 | 8.9 | 8.9 |
| All low-level | 850.5 | 990.2 | 1002.7 | 996.4 | 1008.9 | 1052.3 | 925.1 | 850.5 | 850.5 | 1002.7 | 996.4 | 1008.9 |
| Elevated point | 9.0 | 9.1 | 9.1 | 9.1 | 9.1 | 9.1 | 9.0 | 9.0 | 9.0 | 9.1 | 9.1 | 9.1 |
| Total Anthropogenic | 859.5 | 999.4 | 1011.8 | 1005.6 | 1018.0 | 1061.5 | 934.1 | 859.5 | 859.5 | 1011.8 | 1005.6 | 1018.0 |
| TOTAL | 859.5 | 999.4 | 1011.8 | 1005.6 | 1018.0 | 1061.5 | 934.1 | 859.5 | 859.5 | 1011.8 | 1005.6 | 1018.0 |

**Table A-4b. Comparison of Daily Emissions Totals by Source Category for the Current-Year Emission Inventory for the Memphis Area: June 2001 Simulation Period.**

EDZ 2002 Current-Year Emissions Summary for Memphis EAC Area: June 2001 Episode

| NOX | 020616 | 020617 | 020618 | 020619 | 020620 | 020621 | 020622 |
|---|---|---|---|---|---|---|---|
| Area | 9.5 | 9.3 | 9.9 | 9.9 | 9.9 | 9.9 | 9.9 |
| Motor vehicle | 93.5 | 81.8 | 98.4 | 100.3 | 99.3 | 101.3 | 108.1 |
| Non-road | 83.5 | 83.5 | 97.8 | 97.8 | 97.8 | 97.8 | 97.8 |
| Low-level point | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| Biogenic | 12.0 | 13.8 | 14.4 | 13.6 | 13.2 | 11.0 | 10.3 |
| All low-level | 199.7 | 189.6 | 221.7 | 222.8 | 221.5 | 221.2 | 227.3 |
| Elevated point | 42.9 | 46.4 | 46.1 | 47.0 | 47.0 | 47.9 | 49.0 |
| Total Anthropogenic | 230.6 | 222.2 | 253.4 | 256.2 | 255.2 | 258.1 | 266.0 |
| TOTAL | 242.7 | 236.0 | 267.8 | 269.8 | 268.4 | 269.2 | 276.3 |
| VOC | 020616 | 020617 | 020618 | 020619 | 020620 | 020621 | 020622 |
| Area | 107.4 | 107.4 | 107.4 | 107.4 | 107.4 | 107.4 | 107.4 |
| Motor vehicle | 52.3 | 45.7 | 55.0 | 56.1 | 55.5 | 56.6 | 60.4 |
| Non-road | 39.2 | 39.2 | 27.6 | 27.6 | 27.6 | 27.6 | 27.6 |
| Low-level point | 13.3 | 13.2 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 |
| Biogenic | 443.7 | 584.7 | 592.2 | 506.9 | 466.6 | 170.6 | 273.0 |
| All low-level | 655.9 | 790.3 | 795.7 | 711.5 | 670.7 | 375.7 | 481.9 |
| Elevated point | 4.0 | 4.0 | 4.1 | 4.1 | 4.1 | 4.1 | 4.1 |
| Total Anthropogenic | 216.2 | 209.5 | 207.6 | 208.7 | 208.1 | 209.2 | 213.0 |
| TOTAL | 659.9 | 794.2 | 799.7 | 715.6 | 674.7 | 379.8 | 486.0 |
| CO | 020616 | 020617 | 020618 | 020619 | 020620 | 020621 | 020622 |
| Area | 43.8 | 43.8 | 43.9 | 43.9 | 43.9 | 43.9 | 43.9 |
| Motor vehicle | 581.0 | 508.4 | 611.2 | 623.3 | 617.3 | 629.4 | 671.7 |
| Non-road | 335.6 | 335.6 | 346.0 | 346.0 | 346.0 | 346.0 | 346.0 |
| Low-level point | 8.9 | 8.9 | 8.9 | 8.9 | 8.9 | 8.9 | 8.9 |
| All low-level | 969.3 | 896.7 | 1010.0 | 1022.1 | 1016.1 | 1028.2 | 1070.6 |
| Elevated point | 6.2 | 6.1 | 6.3 | 6.4 | 6.4 | 6.5 | 6.5 |
| Total Anthropogenic | 975.5 | 902.7 | 1016.4 | 1028.5 | 1022.5 | 1034.7 | 1077.0 |
| TOTAL | 975.5 | 902.7 | 1016.4 | 1028.5 | 1022.5 | 1034.7 | 1077.0 |

## **Table A-4b.** *(continued)*

EAC 2001 Current-Year Emissions Summary for Memphis EAC Area: June 2001 Episode

| NOX | 010616 | 010617 | 010618 | 010619 | 010620 | 010621 | 010622 |
|---|---|---|---|---|---|---|---|
| Area | 11.9 | 11.6 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 |
| Motor vehicle | 96.9 | 84.8 | 102.0 | 104.0 | 103.0 | 105.0 | 112.1 |
| Non-road | 71.8 | 71.8 | 86.9 | 86.9 | 86.9 | 86.9 | 86.9 |
| Low-level point | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| Biogenic | 12.0 | 13.8 | 14.4 | 13.6 | 13.2 | 11.0 | 10.3 |
| All low-level | 194.5 | 183.8 | 217.6 | 218.8 | 217.4 | 217.3 | 223.6 |
| Elevated point | 74.7 | 76.9 | 78.5 | 74.2 | 75.1 | 80.7 | 80.7 |
| Total Anthropogenic | 257.2 | 247.0 | 281.7 | 279.5 | 279.3 | 286.9 | 294.0 |
| TOTAL | 269.2 | 260.7 | 296.1 | 293.1 | 292.5 | 297.9 | 304.3 |
| VOC | 010616 | 010617 | 010618 | 010619 | 010620 | 010621 | 010622 |
| Area | 152.6 | 152.6 | 152.6 | 152.6 | 152.6 | 152.6 | 152.6 |
| Motor vehicle | 54.8 | 48.0 | 57.7 | 58.8 | 58.3 | 59.4 | 63.4 |
| Non-road | 39.3 | 39.3 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| Low-level point | 11.0 | 10.9 | 13.8 | 13.8 | 13.8 | 13.8 | 13.8 |
| Biogenic | 443.7 | 584.7 | 592.2 | 506.9 | 466.6 | 170.6 | 273.0 |
| All low-level | 701.3 | 835.4 | 843.7 | 759.6 | 718.7 | 423.8 | 530.2 |
| Elevated point | 4.0 | 4.0 | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 |
| Total Anthropogenic | 261.6 | 254.7 | 255.9 | 257.1 | 256.5 | 257.6 | 261.6 |
| TOTAL | 705.3 | 839.4 | 848.1 | 764.0 | 723.1 | 428.2 | 534.6 |
| CO | 010616 | 010617 | 010618 | 010619 | 010620 | 010621 | 010622 |
| Area | 52.2 | 52.2 | 52.3 | 52.3 | 52.3 | 52.3 | 52.3 |
| Motor vehicle | 607.6 | 531.7 | 639.3 | 651.9 | 645.6 | 658.3 | 702.6 |
| Non-road | 327.8 | 327.8 | 341.5 | 341.5 | 341.5 | 341.5 | 341.5 |
| Low-level point | 8.8 | 8.8 | 8.9 | 8.9 | 8.9 | 8.9 | 8.9 |
| All low-level | 996.4 | 920.4 | 1042.0 | 1054.6 | 1048.3 | 1061.0 | 1105.3 |
| Elevated point | 9.0 | 9.0 | 9.1 | 9.1 | 9.1 | 9.1 | 9.1 |
| Total Anthropogenic | 1005.4 | 929.4 | 1051.1 | 1063.8 | 1057.4 | 1070.1 | 1114.4 |
| TOTAL | 1005.4 | 929.4 | 1051.1 | 1063.8 | 1057.4 | 1070.1 | 1114.4 |

**Table A-4c. Comparison of Daily Emissions Totals by Source Category for the Current-Year Emission Inventory for the Memphis Area: July 2002 Simulation Period.**

EDZ 2002 Current-Year Emissions Summary for Memphis EAC Area: July 2002 Episode

| NOX | 020704 | 020705 | 020706 | 020707 | 020708 | 020709 | 020710 |
|---|---|---|---|---|---|---|---|
| Area | 9.3 | 9.9 | 9.5 | 9.3 | 9.9 | 9.9 | 9.9 |
| Motor vehicle | 80.5 | 106.4 | 92.0 | 80.5 | 96.8 | 98.7 | 97.8 |
| Non-road | 82.8 | 96.7 | 82.8 | 82.8 | 96.7 | 96.7 | 96.7 |
| Low-level point | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| Biogenic | 15.7 | 15.8 | 15.7 | 14.3 | 15.0 | 15.7 | 15.5 |
| All low-level | 189.5 | 229.9 | 201.2 | 188.1 | 219.5 | 222.2 | 221.0 |
| Elevated point | 50.0 | 48.3 | 53.8 | 53.5 | 56.4 | 55.4 | 57.2 |
| Total Anthropogenic | 223.8 | 262.5 | 239.3 | 227.3 | 260.9 | 261.9 | 262.7 |
| TOTAL | 239.5 | 278.2 | 255.0 | 241.6 | 275.9 | 277.6 | 278.1 |
| VOC | 020704 | 020705 | 020706 | 020707 | 020708 | 020709 | 020710 |
| Area | 107.4 | 107.4 | 107.4 | 107.4 | 107.4 | 107.4 | 107.4 |
| Motor vehicle | 46.9 | 62.0 | 53.6 | 46.9 | 56.4 | 57.5 | 57.0 |
| Non-road | 38.2 | 27.0 | 38.2 | 38.2 | 27.0 | 27.0 | 27.0 |
| Low-level point | 13.2 | 13.5 | 13.3 | 13.2 | 13.5 | 13.5 | 13.5 |
| Biogenic | 645.7 | 572.6 | 662.8 | 579.4 | 586.9 | 619.4 | 509.2 |
| All low-level | 851.5 | 782.6 | 875.4 | 785.2 | 791.2 | 824.9 | 714.1 |
| Elevated point | 4.1 | 4.1 | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 |
| Total Anthropogenic | 209.9 | 214.0 | 216.8 | 209.9 | 208.5 | 209.6 | 209.1 |
| TOTAL | 855.6 | 786.7 | 879.6 | 789.3 | 795.4 | 829.1 | 718.3 |
| CO | 020704 | 020705 | 020706 | 020707 | 020708 | 020709 | 020710 |
| Area | 43.8 | 43.9 | 43.8 | 43.8 | 43.9 | 43.9 | 43.9 |
| Motor vehicle | 520.4 | 687.6 | 594.7 | 520.4 | 625.7 | 638.1 | 631.9 |
| Non-road | 328.1 | 338.3 | 328.1 | 328.1 | 338.3 | 338.3 | 338.3 |
| Low-level point | 8.9 | 8.9 | 8.9 | 8.9 | 8.9 | 8.9 | 8.9 |
| All low-level | 901.2 | 1078.8 | 975.5 | 901.2 | 1016.8 | 1029.2 | 1023.0 |
| Elevated point | 6.6 | 6.5 | 6.7 | 6.7 | 6.8 | 6.8 | 6.9 |
| Total Anthropogenic | 907.7 | 1085.3 | 982.3 | 907.9 | 1023.6 | 1036.0 | 1029.9 |
| TOTAL | 907.7 | 1085.3 | 982.3 | 907.8 | 1023.6 | 1036.0 | 1029.9 |

## Table A-4c. *(continued)*

EAC 2001 Current-Year Emissions Summary for Memphis EAC Area: July 2002 Episode

| NOX | 010704 | 010705 | 010706 | 010707 | 010708 | 010709 | 010710 |
|---|---|---|---|---|---|---|---|
| Area | 11.6 | 12.5 | 11.9 | 11.6 | 12.5 | 12.5 | 12.5 |
| Motor vehicle | 83.5 | 110.3 | 95.4 | 83.5 | 100.4 | 102.4 | 101.4 |
| Non-road | 71.1 | 85.7 | 71.1 | 71.1 | 85.7 | 85.7 | 85.7 |
| Low-level point | 1.8 | 1.9 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 |
| Biogenic | 15.7 | 15.8 | 15.7 | 14.3 | 15.0 | 15.7 | 15.5 |
| All low-level | 183.8 | 226.1 | 196.0 | 182.3 | 215.4 | 218.1 | 216.9 |
| Elevated point | 76.9 | 80.7 | 74.7 | 76.9 | 78.5 | 74.2 | 75.1 |
| Total Anthropogenic | 244.9 | 291.0 | 254.9 | 244.9 | 278.9 | 276.7 | 276.5 |
| TOTAL | 260.7 | 306.8 | 270.6 | 259.2 | 293.9 | 292.4 | 292.0 |
| VOC | 010704 | 010705 | 010706 | 010707 | 010708 | 010709 | 010710 |
| Area | 152.6 | 152.6 | 152.6 | 152.6 | 152.6 | 152.6 | 152.6 |
| Motor vehicle | 49.3 | 65.1 | 56.3 | 49.3 | 59.3 | 60.4 | 59.8 |
| Non-road | 38.3 | 26.9 | 38.3 | 38.3 | 26.9 | 26.9 | 26.9 |
| Low-level point | 10.9 | 13.8 | 11.0 | 10.9 | 13.8 | 13.8 | 13.8 |
| Biogenic | 645.7 | 572.6 | 662.8 | 579.4 | 586.9 | 619.4 | 509.2 |
| All low-level | 896.7 | 831.0 | 921.0 | 830.5 | 839.3 | 873.1 | 762.3 |
| Elevated point | 4.0 | 4.4 | 4.0 | 4.0 | 4.4 | 4.4 | 4.4 |
| Total Anthropogenic | 255.0 | 262.7 | 262.1 | 255.0 | 256.9 | 258.0 | 257.4 |
| TOTAL | 900.7 | 835.4 | 925.0 | 834.4 | 843.7 | 877.5 | 766.7 |
| CO | 010704 | 010705 | 010706 | 010707 | 010708 | 010709 | 010710 |
| Area | 52.2 | 52.3 | 52.2 | 52.2 | 52.3 | 52.3 | 52.3 |
| Motor vehicle | 545.2 | 720.4 | 623.1 | 545.2 | 655.5 | 668.5 | 662.0 |
| Non-road | 320.3 | 333.9 | 320.3 | 320.3 | 333.9 | 333.9 | 333.9 |
| Low-level point | 8.8 | 8.9 | 8.8 | 8.8 | 8.9 | 8.9 | 8.9 |
| All low-level | 926.4 | 1115.4 | 1004.4 | 926.4 | 1050.5 | 1063.5 | 1057.0 |
| Elevated point | 9.0 | 9.1 | 9.0 | 9.0 | 9.1 | 9.1 | 9.1 |
| Total Anthropogenic | 935.4 | 1124.6 | 1013.4 | 935.4 | 1059.7 | 1072.7 | 1066.2 |
| TOTAL | 935.4 | 1124.6 | 1013.4 | 935.4 | 1059.7 | 1072.7 | 1066.2 |

**Table A-5a. Comparison of Daily Emissions Totals by Source Category for the 2007 Emission Inventory for Grid 3: August/September 1999 Simulation Period.**

EDZ 2007 Emissions Summary for Grid 3: August/September 1999 Episode

| NOX | 070829 | 070830 | 070831 | 070901 | 070902 | 070903 | 070904 | 070905 | 070906 | 070907 | 070908 | 070909 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Area | 273 | 296 | 296 | 296 | 296 | 296 | 281 | 273 | 273 | 296 | 296 | 296 |
| Motor vehicle | 1218 | 1464 | 1493 | 1479 | 1508 | 1609 | 1392 | 1218 | 1218 | 1493 | 1479 | 1508 |
| Non-road | 654 | 810 | 810 | 810 | 810 | 810 | 654 | 654 | 654 | 810 | 810 | 810 |
| Low-level point | 97 | 96 | 94 | 93 | 94 | 105 | 93 | 99 | 99 | 97 | 95 | 105 |
| Biogenic | 378 | 336 | 314 | 353 | 377 | 375 | 362 | 363 | 358 | 346 | 327 | 306 |
| All low-level | 2620 | 3002 | 3007 | 3030 | 3084 | 3195 | 2782 | 2607 | 2602 | 3042 | 3006 | 3024 |
| Elevated point | 986 | 995 | 1023 | 1015 | 1023 | 1026 | 985 | 980 | 997 | 1043 | 1035 | 1023 |
| Total Anthropogenic | 3228 | 3660 | 3716 | 3693 | 3730 | 3846 | 3404 | 3224 | 3241 | 3739 | 3715 | 3741 |
| TOTAL | 3606 | 3996 | 4030 | 4045 | 4107 | 4221 | 3767 | 3587 | 3599 | 4085 | 4042 | 4047 |
| VOC | 070829 | 070830 | 070831 | 070901 | 070902 | 070903 | 070904 | 070905 | 070906 | 070907 | 070908 | 070909 |
| Area | 1737 | 1738 | 1738 | 1738 | 1738 | 1738 | 1737 | 1737 | 1737 | 1738 | 1738 | 1738 |
| Motor vehicle | 791 | 952 | 970 | 961 | 980 | 1046 | 904 | 791 | 791 | 970 | 961 | 980 |
| Non-road | 544 | 341 | 341 | 341 | 341 | 341 | 544 | 544 | 544 | 341 | 341 | 341 |
| Low-level point | 299 | 382 | 379 | 376 | 378 | 402 | 352 | 304 | 304 | 384 | 380 | 401 |
| Biogenic | 33636 | 25595 | 21501 | 26083 | 28484 | 28505 | 29671 | 24904 | 25682 | 25391 | 24251 | 16207 |
| All low-level | 37007 | 29007 | 24929 | 29499 | 31920 | 32032 | 33209 | 28280 | 29058 | 28824 | 27670 | 19666 |
| Elevated point | 87 | 93 | 94 | 94 | 93 | 93 | 89 | 87 | 87 | 94 | 94 | 93 |
| Total Anthropogenic | 3458 | 3505 | 3521 | 3509 | 3529 | 3620 | 3626 | 3463 | 3464 | 3527 | 3513 | 3553 |
| TOTAL | 37094 | 29100 | 25022 | 29592 | 32013 | 32125 | 33297 | 28367 | 29146 | 28918 | 27764 | 19759 |
| CO | 070829 | 070830 | 070831 | 070901 | 070902 | 070903 | 070904 | 070905 | 070906 | 070907 | 070908 | 070909 |
| Area | 1680 | 1691 | 1691 | 1691 | 1691 | 1691 | 1684 | 1680 | 1680 | 1691 | 1691 | 1691 |
| Motor vehicle | 7172 | 8624 | 8794 | 8709 | 8880 | 9477 | 8197 | 7172 | 7172 | 8794 | 8709 | 8880 |
| Non-road | 5506 | 5352 | 5352 | 5352 | 5352 | 5352 | 5506 | 5506 | 5506 | 5352 | 5352 | 5352 |
| Low-level point | 729 | 362 | 294 | 257 | 287 | 797 | 474 | 856 | 842 | 435 | 357 | 783 |
| All low-level | 15088 | 16029 | 16131 | 16009 | 16210 | 17318 | 15862 | 15215 | 15200 | 16273 | 16109 | 16706 |
| Elevated point | 834 | 872 | 877 | 876 | 875 | 876 | 837 | 835 | 838 | 877 | 876 | 875 |
| Total Anthropogenic | 15921 | 16902 | 17008 | 16886 | 17085 | 18194 | 16699 | 16049 | 16039 | 17150 | 16985 | 17580 |
| TOTAL | 15921 | 16902 | 17008 | 16886 | 17085 | 18194 | 16699 | 16049 | 16039 | 17150 | 16985 | 17580 |

**Table A-5a.** *(continued)*

EAC 2007 Emissions Summary for Grid 3: August/September 1999 Episode

| NOX | 070829 | 070830 | 070831 | 070901 | 070902 | 070903 | 070904 | 070905 | 070906 | 070907 | 070908 | 070909 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Area | 261 | 287 | 287 | 287 | 287 | 287 | 270 | 261 | 261 | 287 | 287 | 287 |
| Motor vehicle | 1221 | 1469 | 1498 | 1483 | 1512 | 1614 | 1396 | 1221 | 1221 | 1498 | 1483 | 1512 |
| Non-road | 720 | 881 | 881 | 881 | 881 | 881 | 720 | 720 | 720 | 881 | 881 | 881 |
| Low-level point | 122 | 135 | 135 | 135 | 135 | 135 | 126 | 122 | 122 | 135 | 135 | 135 |
| Biogenic | 378 | 336 | 314 | 353 | 377 | 375 | 362 | 363 | 358 | 346 | 327 | 306 |
| All low-level | 2702 | 3108 | 3116 | 3139 | 3193 | 3293 | 2874 | 2687 | 2682 | 3147 | 3114 | 3121 |
| Elevated point | 1059 | 1092 | 1112 | 1109 | 1128 | 1123 | 1059 | 1059 | 1077 | 1133 | 1130 | 1128 |
| Total Anthropogenic | 3383 | 3864 | 3913 | 3895 | 3944 | 4040 | 3571 | 3383 | 3401 | 3934 | 3917 | 3944 |
| TOTAL | 3761 | 4200 | 4227 | 4248 | 4321 | 4415 | 3933 | 3746 | 3759 | 4280 | 4243 | 4249 |
| VOC | 070829 | 070830 | 070831 | 070901 | 070902 | 070903 | 070904 | 070905 | 070906 | 070907 | 070908 | 070909 |
| Area | 2027 | 2027 | 2027 | 2027 | 2027 | 2027 | 2027 | 2027 | 2027 | 2027 | 2027 | 2027 |
| Motor vehicle | 791 | 951 | 970 | 960 | 979 | 1045 | 904 | 791 | 791 | 970 | 960 | 979 |
| Non-road | 577 | 356 | 356 | 356 | 356 | 356 | 577 | 577 | 577 | 356 | 356 | 356 |
| Low-level point | 253 | 381 | 381 | 381 | 381 | 381 | 285 | 253 | 253 | 381 | 381 | 381 |
| Biogenic | 33636 | 25595 | 21501 | 26083 | 28484 | 28505 | 29671 | 24904 | 25682 | 25391 | 24251 | 16207 |
| All low-level | 37282 | 29310 | 25235 | 29807 | 32227 | 32314 | 33462 | 28550 | 29328 | 29125 | 27975 | 19950 |
| Elevated point | 91 | 105 | 106 | 105 | 105 | 105 | 93 | 91 | 92 | 106 | 105 | 105 |
| Total Anthropogenic | 3738 | 3820 | 3839 | 3829 | 3848 | 3914 | 3885 | 3738 | 3738 | 3839 | 3829 | 3848 |
| TOTAL | 37373 | 29415 | 25340 | 29913 | 32332 | 32419 | 33556 | 28642 | 29420 | 29230 | 28080 | 20055 |
| CO | 070829 | 070830 | 070831 | 070901 | 070902 | 070903 | 070904 | 070905 | 070906 | 070907 | 070908 | 070909 |
| Area | 1730 | 1738 | 1738 | 1738 | 1738 | 1738 | 1733 | 1730 | 1730 | 1738 | 1738 | 1738 |
| Motor vehicle | 7852 | 9441 | 9628 | 9535 | 9722 | 10376 | 8974 | 7852 | 7852 | 9628 | 9535 | 9722 |
| Non-road | 5636 | 5375 | 5375 | 5375 | 5375 | 5375 | 5636 | 5636 | 5636 | 5375 | 5375 | 5375 |
| Low-level point | 207 | 227 | 227 | 227 | 227 | 227 | 216 | 207 | 207 | 227 | 227 | 227 |
| All low-level | 15426 | 16781 | 16968 | 16875 | 17062 | 17716 | 16559 | 15426 | 15426 | 16968 | 16875 | 17062 |
| Elevated point | 867 | 930 | 933 | 932 | 930 | 931 | 873 | 867 | 870 | 933 | 932 | 930 |
| Total Anthropogenic | 16292 | 17712 | 17902 | 17807 | 17992 | 18648 | 17432 | 16292 | 16296 | 17902 | 17807 | 17992 |
| TOTAL | 16292 | 17712 | 17902 | 17807 | 17992 | 18648 | 17432 | 16292 | 16296 | 17902 | 17807 | 17992 |

**Table A-5b. Comparison of Daily Emissions Totals by Source Category for the 2007 Emission Inventory for Grid 3: June 2001 Simulation Period.**

EDZ 2007 Emissions Summary for Grid 3: June 2001 Episode

| NOX | 070616 | 070617 | 070618 | 070619 | 070620 | 070621 | 070622 |
|---|---|---|---|---|---|---|---|
| Area | 256 | 249 | 271 | 271 | 271 | 271 | 271 |
| Motor vehicle | 1391 | 1217 | 1464 | 1493 | 1478 | 1507 | 1609 |
| Non-road | 737 | 737 | 903 | 903 | 903 | 903 | 903 |
| Low-level point | 90 | 89 | 99 | 94 | 97 | 95 | 99 |
| Biogenic | 350 | 389 | 400 | 391 | 374 | 336 | 307 |
| All low-level | 2825 | 2682 | 3136 | 3152 | 3122 | 3112 | 3188 |
| Elevated point | 970 | 952 | 1003 | 1031 | 1033 | 1021 | 988 |
| Total Anthropogenic | 3445 | 3245 | 3739 | 3792 | 3782 | 3797 | 3868 |
| TOTAL | 3795 | 3634 | 4140 | 4183 | 4155 | 4133 | 4176 |
| VOC | 070616 | 070617 | 070618 | 070619 | 070620 | 070621 | 070622 |
| Area | 1559 | 1559 | 1560 | 1560 | 1560 | 1560 | 1560 |
| Motor vehicle | 913 | 799 | 961 | 980 | 970 | 989 | 1056 |
| Non-road | 872 | 872 | 453 | 453 | 453 | 453 | 453 |
| Low-level point | 344 | 282 | 387 | 377 | 384 | 379 | 386 |
| Biogenic | 32242 | 38969 | 39530 | 33605 | 31571 | 24887 | 16452 |
| All low-level | 35929 | 42480 | 42889 | 36974 | 34937 | 28268 | 19906 |
| Elevated point | 89 | 87 | 94 | 94 | 94 | 95 | 94 |
| Total Anthropogenic | 3777 | 3598 | 3454 | 3463 | 3460 | 3476 | 3548 |
| TOTAL | 36018 | 42567 | 42983 | 37068 | 35031 | 28363 | 20000 |
| CO | 070616 | 070617 | 070618 | 070619 | 070620 | 070621 | 070622 |
| Area | 1009 | 1006 | 1016 | 1016 | 1016 | 1016 | 1016 |
| Motor vehicle | 8195 | 7171 | 8622 | 8793 | 8708 | 8878 | 9476 |
| Non-road | 7341 | 7341 | 6265 | 6265 | 6265 | 6265 | 6265 |
| Low-level point | 299 | 356 | 453 | 267 | 374 | 296 | 447 |
| All low-level | 16845 | 15874 | 16356 | 16342 | 16363 | 16456 | 17205 |
| Elevated point | 844 | 838 | 880 | 883 | 884 | 888 | 883 |
| Total Anthropogenic | 17689 | 16711 | 17236 | 17225 | 17247 | 17344 | 18087 |
| TOTAL | 17689 | 16711 | 17236 | 17225 | 17247 | 17344 | 18087 |

**Table A-5b.** *(continued)*

EAC 2007 Emissions Summary for Grid 3: June 2001 Episode

| NOX | 070616 | 070617 | 070618 | 070619 | 070620 | 070621 | 070622 |
|---|---|---|---|---|---|---|---|
| Area | 270 | 261 | 287 | 287 | 287 | 287 | 287 |
| Motor vehicle | 1395 | 1221 | 1468 | 1497 | 1482 | 1511 | 1613 |
| Non-road | 802 | 802 | 973 | 973 | 973 | 973 | 973 |
| Low-level point | 124 | 120 | 135 | 135 | 135 | 135 | 135 |
| Biogenic | 350 | 389 | 400 | 391 | 374 | 336 | 307 |
| All low-level | 2941 | 2793 | 3263 | 3282 | 3251 | 3242 | 3315 |
| Elevated point | 1088 | 1081 | 1130 | 1146 | 1160 | 1158 | 1140 |
| Total Anthropogenic | 3679 | 3485 | 3992 | 4038 | 4037 | 4064 | 4148 |
| TOTAL | 4029 | 3873 | 4392 | 4428 | 4410 | 4400 | 4456 |
| VOC | 070616 | 070617 | 070618 | 070619 | 070620 | 070621 | 070622 |
| Area | 2027 | 2027 | 2027 | 2027 | 2027 | 2027 | 2027 |
| Motor vehicle | 912 | 798 | 960 | 979 | 969 | 988 | 1055 |
| Non-road | 898 | 898 | 465 | 465 | 465 | 465 | 465 |
| Low-level point | 288 | 256 | 385 | 385 | 385 | 385 | 385 |
| Biogenic | 32242 | 38969 | 39530 | 33605 | 31571 | 24887 | 16452 |
| All low-level | 36367 | 42948 | 43367 | 37461 | 35418 | 28753 | 20385 |
| Elevated point | 95 | 92 | 104 | 104 | 104 | 105 | 104 |
| Total Anthropogenic | 4220 | 4071 | 3941 | 3960 | 3951 | 3971 | 4037 |
| TOTAL | 36462 | 43040 | 43471 | 37565 | 35522 | 28858 | 20489 |
| CO | 070616 | 070617 | 070618 | 070619 | 070620 | 070621 | 070622 |
| Area | 1733 | 1730 | 1738 | 1738 | 1738 | 1738 | 1738 |
| Motor vehicle | 8977 | 7855 | 9445 | 9632 | 9538 | 9725 | 10380 |
| Non-road | 7432 | 7432 | 6264 | 6264 | 6264 | 6264 | 6264 |
| Low-level point | 212 | 203 | 225 | 225 | 225 | 225 | 225 |
| All low-level | 18355 | 17221 | 17672 | 17859 | 17766 | 17953 | 18607 |
| Elevated point | 878 | 869 | 928 | 930 | 930 | 934 | 930 |
| Total Anthropogenic | 19232 | 18090 | 18600 | 18789 | 18695 | 18887 | 19538 |
| TOTAL | 19232 | 18090 | 18600 | 18789 | 18695 | 18887 | 19538 |

**Table A-5c. Comparison of Daily Emissions Totals by Source Category for the 2007 Emission Inventory for Grid 3: July 2002 Simulation Period.**

EDZ 2007 Emissions Summary for Grid 3: July 2002 Episode

| NOX | 070704 | 070705 | 070706 | 070707 | 070708 | 070709 | 070710 |
|---|---|---|---|---|---|---|---|
| Area | 249 | 271 | 256 | 249 | 271 | 271 | 271 |
| Motor vehicle | 1205 | 1593 | 1377 | 1205 | 1449 | 1478 | 1463 |
| Non-road | 725 | 886 | 725 | 725 | 886 | 886 | 886 |
| Low-level point | 88 | 95 | 91 | 87 | 99 | 95 | 96 |
| Biogenic | 426 | 444 | 438 | 410 | 423 | 438 | 438 |
| All low-level | 2693 | 3288 | 2888 | 2676 | 3128 | 3167 | 3154 |
| Elevated point | 981 | 1002 | 1001 | 991 | 1012 | 1003 | 1016 |
| Total Anthropogenic | 3249 | 3846 | 3450 | 3258 | 3717 | 3732 | 3732 |
| TOTAL | 3674 | 4290 | 3888 | 3668 | 4140 | 4170 | 4170 |
| VOC | 070704 | 070705 | 070706 | 070707 | 070708 | 070709 | 070710 |
| Area | 1559 | 1560 | 1559 | 1559 | 1560 | 1560 | 1560 |
| Motor vehicle | 809 | 1069 | 924 | 809 | 973 | 992 | 982 |
| Non-road | 850 | 445 | 850 | 850 | 445 | 445 | 445 |
| Low-level point | 277 | 379 | 345 | 275 | 387 | 379 | 380 |
| Biogenic | 32335 | 42509 | 45719 | 40079 | 41123 | 41730 | 38171 |
| All low-level | 35830 | 45962 | 49398 | 43572 | 44487 | 45105 | 41538 |
| Elevated point | 87 | 94 | 89 | 87 | 94 | 94 | 94 |
| Total Anthropogenic | 3582 | 3547 | 3768 | 3580 | 3458 | 3469 | 3461 |
| TOTAL | 35917 | 46056 | 49488 | 43659 | 44581 | 45199 | 41632 |
| CO | 070704 | 070705 | 070706 | 070707 | 070708 | 070709 | 070710 |
| Area | 1006 | 1016 | 1009 | 1006 | 1016 | 1016 | 1016 |
| Motor vehicle | 7154 | 9453 | 8175 | 7154 | 8601 | 8772 | 8686 |
| Non-road | 7173 | 6128 | 7173 | 7173 | 6128 | 6128 | 6128 |
| Low-level point | 263 | 291 | 305 | 228 | 464 | 281 | 308 |
| All low-level | 15595 | 16889 | 16662 | 15560 | 16210 | 16197 | 16139 |
| Elevated point | 843 | 885 | 847 | 842 | 883 | 885 | 885 |
| Total Anthropogenic | 16438 | 17773 | 17509 | 16403 | 17093 | 17082 | 17024 |
| TOTAL | 16438 | 17773 | 17509 | 16403 | 17093 | 17082 | 17024 |

**Table A-5c.** *(continued)*

EAC 2007 Emissions Summary for Grid 3: July 2002 Episode

| NOX | 070704 | 070705 | 070706 | 070707 | 070708 | 070709 | 070710 |
|---|---|---|---|---|---|---|---|
| Area | 261 | 287 | 270 | 261 | 287 | 287 | 287 |
| Motor vehicle | 1209 | 1597 | 1381 | 1209 | 1453 | 1482 | 1468 |
| Non-road | 790 | 956 | 790 | 790 | 956 | 956 | 956 |
| Low-level point | 120 | 135 | 124 | 120 | 135 | 135 | 135 |
| Biogenic | 426 | 444 | 438 | 410 | 423 | 438 | 438 |
| All low-level | 2806 | 3419 | 3004 | 2790 | 3254 | 3298 | 3283 |
| Elevated point | 1081 | 1140 | 1109 | 1102 | 1130 | 1125 | 1139 |
| Total Anthropogenic | 3461 | 4116 | 3675 | 3482 | 3961 | 3985 | 3984 |
| TOTAL | 3887 | 4559 | 4113 | 3892 | 4384 | 4423 | 4422 |
| VOC | 070704 | 070705 | 070706 | 070707 | 070708 | 070709 | 070710 |
| Area | 2027 | 2027 | 2027 | 2027 | 2027 | 2027 | 2027 |
| Motor vehicle | 808 | 1068 | 924 | 808 | 972 | 991 | 981 |
| Non-road | 877 | 457 | 877 | 877 | 457 | 457 | 457 |
| Low-level point | 256 | 385 | 288 | 256 | 385 | 385 | 385 |
| Biogenic | 32335 | 42509 | 45719 | 40079 | 41123 | 41730 | 38171 |
| All low-level | 36303 | 46447 | 49835 | 44047 | 44964 | 45591 | 42022 |
| Elevated point | 92 | 104 | 95 | 92 | 104 | 104 | 104 |
| Total Anthropogenic | 4061 | 4042 | 4211 | 4061 | 3945 | 3965 | 3955 |
| TOTAL | 36395 | 46551 | 49930 | 44140 | 45068 | 45695 | 42126 |
| CO | 070704 | 070705 | 070706 | 070707 | 070708 | 070709 | 070710 |
| Area | 1730 | 1738 | 1733 | 1730 | 1738 | 1738 | 1738 |
| Motor vehicle | 7843 | 10364 | 8964 | 7843 | 9431 | 9617 | 9524 |
| Non-road | 7267 | 6131 | 7267 | 7267 | 6131 | 6131 | 6131 |
| Low-level point | 203 | 225 | 212 | 203 | 225 | 225 | 225 |
| All low-level | 17044 | 18458 | 18176 | 17044 | 17524 | 17711 | 17618 |
| Elevated point | 869 | 930 | 878 | 869 | 928 | 930 | 930 |
| Total Anthropogenic | 17913 | 19388 | 19054 | 17913 | 18452 | 18641 | 18547 |
| TOTAL | 17913 | 19388 | 19054 | 17913 | 18452 | 18641 | 18547 |

**Table A-6a. Comparison of Daily Emissions Totals by Source Category for the 2007 Emission Inventory for the Memphis Area: August/September 1999 Simulation Period.**

EDZ 2007 Emissions Summary for Memphis EAC Area: August/September 1999 Episode

| NOX | 070829 | 070830 | 070831 | 070901 | 070902 | 070903 | 070904 | 070905 | 070906 | 070907 | 070908 | 070909 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Area | 13.4 | 14.2 | 14.2 | 14.2 | 14.2 | 14.2 | 13.7 | 13.4 | 13.4 | 14.2 | 14.2 | 14.2 |
| Motor vehicle | 52.9 | 63.7 | 64.9 | 64.3 | 65.5 | 70.0 | 60.5 | 52.9 | 52.9 | 64.9 | 64.3 | 65.5 |
| Non-road | 77.9 | 88.2 | 88.2 | 88.2 | 88.2 | 88.2 | 77.9 | 77.9 | 77.9 | 88.2 | 88.2 | 88.2 |
| Low-level point | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 |
| Biogenic | 13.2 | 12.2 | 11.8 | 13.0 | 14.2 | 14.1 | 12.9 | 13.2 | 12.6 | 12.0 | 10.4 | 10.6 |
| All low-level | 158.8 | 179.6 | 180.4 | 181.0 | 183.5 | 187.8 | 166.3 | 158.8 | 158.2 | 180.6 | 178.4 | 179.9 |
| Elevated point | 16.7 | 16.9 | 16.9 | 16.9 | 16.9 | 16.9 | 16.8 | 16.7 | 20.4 | 20.6 | 20.6 | 16.9 |
| Total Anthropogenic | 162.3 | 184.3 | 185.6 | 184.9 | 186.2 | 190.6 | 170.2 | 162.3 | 166.0 | 189.2 | 188.6 | 186.2 |
| TOTAL | 175.5 | 196.5 | 197.3 | 197.9 | 200.4 | 204.7 | 183.1 | 175.5 | 178.5 | 201.2 | 199.0 | 196.8 |
| VOC | 070829 | 070830 | 070831 | 070901 | 070902 | 070903 | 070904 | 070905 | 070906 | 070907 | 070908 | 070909 |
| Area | 95.0 | 95.0 | 95.0 | 95.0 | 95.0 | 95.0 | 95.0 | 95.0 | 95.0 | 95.0 | 95.0 | 95.0 |
| Motor vehicle | 31.1 | 37.4 | 38.1 | 37.8 | 38.5 | 41.1 | 35.5 | 31.1 | 31.1 | 38.1 | 37.8 | 38.5 |
| Non-road | 23.6 | 19.0 | 19.0 | 19.0 | 19.0 | 19.0 | 23.6 | 23.6 | 23.6 | 19.0 | 19.0 | 19.0 |
| Low-level point | 11.8 | 11.9 | 11.9 | 11.9 | 11.9 | 11.9 | 11.8 | 11.8 | 11.8 | 11.9 | 11.9 | 11.9 |
| Biogenic | 474.4 | 374.7 | 396.1 | 457.4 | 536.3 | 522.5 | 387.4 | 406.3 | 320.1 | 352.1 | 110.1 | 272.2 |
| All low-level | 635.8 | 538.0 | 560.1 | 621.1 | 700.6 | 689.4 | 553.3 | 567.7 | 481.5 | 516.1 | 273.7 | 436.6 |
| Elevated point | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Total Anthropogenic | 163.7 | 165.5 | 166.3 | 165.9 | 166.6 | 169.2 | 168.2 | 163.7 | 163.7 | 166.3 | 165.9 | 166.6 |
| TOTAL | 638.0 | 540.3 | 562.4 | 623.3 | 702.9 | 691.7 | 555.6 | 569.9 | 483.8 | 518.4 | 276.0 | 438.9 |
| CO | 070829 | 070830 | 070831 | 070901 | 070902 | 070903 | 070904 | 070905 | 070906 | 070907 | 070908 | 070909 |
| Area | 62.9 | 63.1 | 63.1 | 63.1 | 63.1 | 63.1 | 63.0 | 62.9 | 62.9 | 63.1 | 63.1 | 63.1 |
| Motor vehicle | 316.6 | 380.6 | 388.2 | 384.4 | 391.9 | 418.3 | 361.8 | 316.6 | 316.6 | 388.2 | 384.4 | 391.9 |
| Non-road | 303.2 | 334.6 | 334.6 | 334.6 | 334.6 | 334.6 | 303.2 | 303.2 | 303.2 | 334.6 | 334.6 | 334.6 |
| Low-level point | 8.6 | 8.6 | 8.6 | 8.6 | 8.6 | 8.6 | 8.6 | 8.6 | 8.6 | 8.6 | 8.6 | 8.6 |
| All low-level | 691.3 | 786.9 | 794.4 | 790.6 | 798.2 | 824.6 | 736.6 | 691.3 | 691.3 | 794.4 | 790.6 | 798.2 |
| Elevated point | 10.4 | 10.6 | 10.6 | 10.6 | 10.6 | 10.6 | 10.4 | 10.4 | 10.4 | 10.6 | 10.6 | 10.6 |
| Total Anthropogenic | 701.7 | 797.4 | 805.0 | 801.2 | 808.7 | 835.1 | 747.0 | 701.7 | 701.7 | 805.0 | 801.2 | 808.7 |
| TOTAL | 701.7 | 797.4 | 805.0 | 801.2 | 808.7 | 835.1 | 747.0 | 701.7 | 701.7 | 805.0 | 801.2 | 808.7 |

**Table A-6a.** *(continued)*

EAC 2007 Emissions Summary for Memphis EAC Area: August/September 1999 Episode

| NOX | 070829 | 070830 | 070831 | 070901 | 070902 | 070903 | 070904 | 070905 | 070906 | 070907 | 070908 | 070909 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Area | 12.3 | 13.2 | 13.2 | 13.2 | 13.2 | 13.2 | 12.6 | 12.3 | 12.3 | 13.2 | 13.2 | 13.2 |
| Motor vehicle | 56.5 | 68.0 | 69.3 | 68.7 | 70.0 | 74.7 | 64.6 | 56.5 | 56.5 | 69.3 | 68.7 | 70.0 |
| Non-road | 73.3 | 83.7 | 83.7 | 83.7 | 83.7 | 83.7 | 73.3 | 73.3 | 73.3 | 83.7 | 83.7 | 83.7 |
| Low-level point | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 |
| Biogenic | 13.2 | 12.2 | 11.8 | 13.0 | 14.2 | 14.1 | 12.9 | 13.2 | 12.6 | 12.0 | 10.4 | 10.6 |
| All low-level | 157.4 | 179.2 | 180.1 | 180.7 | 183.2 | 187.8 | 165.5 | 157.4 | 156.8 | 180.3 | 178.1 | 179.6 |
| Elevated point | 27.4 | 27.6 | 27.6 | 27.6 | 27.6 | 27.6 | 27.4 | 27.4 | 32.5 | 32.7 | 32.7 | 27.6 |
| Total Anthropogenic | 171.6 | 194.6 | 195.9 | 195.3 | 196.6 | 201.3 | 180.0 | 171.6 | 176.7 | 201.0 | 200.4 | 196.6 |
| TOTAL | 184.8 | 206.8 | 207.7 | 208.3 | 210.8 | 215.4 | 192.9 | 184.8 | 189.3 | 213.0 | 210.8 | 207.2 |
| VOC | 070829 | 070830 | 070831 | 070901 | 070902 | 070903 | 070904 | 070905 | 070906 | 070907 | 070908 | 070909 |
| Area | 133.3 | 133.3 | 133.3 | 133.3 | 133.3 | 133.3 | 133.3 | 133.3 | 133.3 | 133.3 | 133.3 | 133.3 |
| Motor vehicle | 31.6 | 38.0 | 38.7 | 38.4 | 39.1 | 41.7 | 36.1 | 31.6 | 31.6 | 38.7 | 38.4 | 39.1 |
| Non-road | 22.9 | 18.4 | 18.4 | 18.4 | 18.4 | 18.4 | 22.9 | 22.9 | 22.9 | 18.4 | 18.4 | 18.4 |
| Low-level point | 9.4 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 | 9.5 | 9.4 | 9.4 | 11.7 | 11.7 | 11.7 |
| Biogenic | 474.4 | 374.7 | 396.1 | 457.4 | 536.3 | 522.5 | 387.4 | 406.3 | 320.1 | 352.1 | 110.1 | 272.2 |
| All low-level | 671.6 | 576.1 | 598.2 | 659.2 | 738.8 | 727.6 | 589.3 | 603.5 | 517.3 | 554.2 | 311.8 | 474.7 |
| Elevated point | 4.2 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.2 | 4.2 | 4.2 | 4.5 | 4.5 | 4.5 |
| Total Anthropogenic | 201.5 | 205.8 | 206.6 | 206.2 | 207.0 | 209.6 | 206.1 | 201.5 | 201.5 | 206.6 | 206.2 | 207.0 |
| TOTAL | 675.8 | 580.6 | 602.7 | 663.6 | 743.2 | 732.1 | 593.5 | 607.8 | 521.6 | 558.7 | 316.3 | 479.2 |
| CO | 070829 | 070830 | 070831 | 070901 | 070902 | 070903 | 070904 | 070905 | 070906 | 070907 | 070908 | 070909 |
| Area | 55.5 | 55.7 | 55.7 | 55.7 | 55.7 | 55.7 | 55.5 | 55.5 | 55.5 | 55.7 | 55.7 | 55.7 |
| Motor vehicle | 360.7 | 433.7 | 442.3 | 438.0 | 446.6 | 476.7 | 412.3 | 360.7 | 360.7 | 442.3 | 438.0 | 446.6 |
| Non-road | 298.9 | 330.3 | 330.3 | 330.3 | 330.3 | 330.3 | 298.9 | 298.9 | 298.9 | 330.3 | 330.3 | 330.3 |
| Low-level point | 9.3 | 9.4 | 9.4 | 9.4 | 9.4 | 9.4 | 9.3 | 9.3 | 9.3 | 9.4 | 9.4 | 9.4 |
| All low-level | 724.3 | 829.1 | 837.6 | 833.3 | 841.9 | 872.0 | 776.0 | 724.3 | 724.3 | 837.6 | 833.3 | 841.9 |
| Elevated point | 16.2 | 16.3 | 16.3 | 16.3 | 16.3 | 16.3 | 16.2 | 16.2 | 16.2 | 16.3 | 16.3 | 16.3 |
| Total Anthropogenic | 740.5 | 845.4 | 853.9 | 849.7 | 858.2 | 888.3 | 792.1 | 740.5 | 740.5 | 853.9 | 849.7 | 858.2 |
| TOTAL | 740.5 | 845.4 | 853.9 | 849.6 | 858.2 | 888.3 | 792.1 | 740.5 | 740.5 | 853.9 | 849.6 | 858.2 |

**Table A-6b. Comparison of Daily Emissions Totals by Source Category for the 2007 Emission Inventory for the Memphis Area: June 2001 Simulation Period.**

EDZ 2007 Emissions Summary for Memphis EAC Area: June 2001 Episode

| NOX | 070616 | 070617 | 070618 | 070619 | 070620 | 070621 | 070622 |
|---|---|---|---|---|---|---|---|
| Area | 9.9 | 9.7 | 10.3 | 10.3 | 10.3 | 10.3 | 10.3 |
| Motor vehicle | 60.1 | 52.6 | 63.3 | 64.5 | 63.9 | 65.2 | 69.5 |
| Non-road | 82.0 | 82.0 | 94.1 | 94.1 | 94.1 | 94.1 | 94.1 |
| Low-level point | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 |
| Biogenic | 12.0 | 13.8 | 14.4 | 13.6 | 13.2 | 11.0 | 10.3 |
| All low-level | 165.4 | 159.4 | 183.4 | 183.9 | 182.8 | 181.9 | 185.6 |
| Elevated point | 16.7 | 16.7 | 20.6 | 20.6 | 20.6 | 16.9 | 16.9 |
| Total Anthropogenic | 170.1 | 162.3 | 189.5 | 190.8 | 190.2 | 187.8 | 192.2 |
| TOTAL | 182.1 | 176.1 | 203.9 | 204.4 | 203.4 | 198.8 | 202.5 |
| VOC | 070616 | 070617 | 070618 | 070619 | 070620 | 070621 | 070622 |
| Area | 89.8 | 89.8 | 89.8 | 89.8 | 89.8 | 89.8 | 89.8 |
| Motor vehicle | 36.2 | 31.6 | 38.0 | 38.8 | 38.4 | 39.2 | 41.8 |
| Non-road | 33.2 | 33.2 | 22.8 | 22.8 | 22.8 | 22.8 | 22.8 |
| Low-level point | 11.8 | 11.8 | 11.9 | 11.9 | 11.9 | 11.9 | 11.9 |
| Biogenic | 443.7 | 584.7 | 592.2 | 506.9 | 466.6 | 170.6 | 273.0 |
| All low-level | 614.6 | 751.1 | 754.6 | 670.1 | 629.5 | 334.1 | 439.2 |
| Elevated point | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Total Anthropogenic | 173.2 | 168.6 | 164.7 | 165.5 | 165.1 | 165.9 | 168.5 |
| TOTAL | 616.8 | 753.3 | 756.9 | 672.4 | 631.7 | 336.4 | 441.5 |
| CO | 070616 | 070617 | 070618 | 070619 | 070620 | 070621 | 070622 |
| Area | 35.5 | 35.5 | 35.6 | 35.6 | 35.6 | 35.6 | 35.6 |
| Motor vehicle | 360.8 | 315.7 | 379.6 | 387.1 | 383.3 | 390.9 | 417.2 |
| Non-road | 368.4 | 368.4 | 377.4 | 377.4 | 377.4 | 377.4 | 377.4 |
| Low-level point | 9.3 | 9.3 | 9.3 | 9.3 | 9.3 | 9.3 | 9.3 |
| All low-level | 774.1 | 728.9 | 801.9 | 809.4 | 805.6 | 813.2 | 839.5 |
| Elevated point | 10.4 | 10.4 | 10.6 | 10.6 | 10.6 | 10.6 | 10.6 |
| Total Anthropogenic | 784.5 | 739.3 | 812.4 | 820.0 | 816.2 | 823.7 | 850.0 |
| TOTAL | 784.5 | 739.3 | 812.4 | 820.0 | 816.2 | 823.7 | 850.0 |

## **Table A-6b.** *(continued)*

EAC 2007 Emissions Summary for Memphis EAC Area: June 2001 Episode

| NOX | 070616 | 070617 | 070618 | 070619 | 070620 | 070621 | 070622 |
|---|---|---|---|---|---|---|---|
| Area | 12.6 | 12.3 | 13.2 | 13.2 | 13.2 | 13.2 | 13.2 |
| Motor vehicle | 64.2 | 56.2 | 67.6 | 68.9 | 68.2 | 69.6 | 74.3 |
| Non-road | 77.4 | 77.4 | 89.6 | 89.6 | 89.6 | 89.6 | 89.6 |
| Low-level point | 2.0 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Biogenic | 12.0 | 13.8 | 14.4 | 13.6 | 13.2 | 11.0 | 10.3 |
| All low-level | 168.2 | 161.6 | 186.8 | 187.3 | 186.2 | 185.4 | 189.4 |
| Elevated point | 27.4 | 27.4 | 32.7 | 32.7 | 32.7 | 27.6 | 27.6 |
| Total Anthropogenic | 183.6 | 175.2 | 205.0 | 206.4 | 205.7 | 202.0 | 206.7 |
| TOTAL | 195.6 | 189.0 | 219.4 | 220.0 | 218.9 | 213.0 | 217.0 |
| VOC | 070616 | 070617 | 070618 | 070619 | 070620 | 070621 | 070622 |
| Area | 133.3 | 133.3 | 133.3 | 133.3 | 133.3 | 133.3 | 133.3 |
| Motor vehicle | 36.7 | 32.1 | 38.6 | 39.4 | 39.0 | 39.8 | 42.5 |
| Non-road | 32.5 | 32.5 | 22.1 | 22.1 | 22.1 | 22.1 | 22.1 |
| Low-level point | 8.7 | 8.6 | 10.9 | 10.9 | 10.9 | 10.9 | 10.9 |
| Biogenic | 443.7 | 584.7 | 592.2 | 506.9 | 466.6 | 170.6 | 273.0 |
| All low-level | 654.9 | 791.3 | 797.1 | 712.7 | 672.0 | 376.7 | 481.8 |
| Elevated point | 4.1 | 4.1 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 |
| Total Anthropogenic | 215.3 | 210.6 | 209.3 | 210.1 | 209.7 | 210.4 | 213.1 |
| TOTAL | 659.0 | 795.4 | 801.4 | 717.0 | 676.3 | 381.0 | 486.1 |
| CO | 070616 | 070617 | 070618 | 070619 | 070620 | 070621 | 070622 |
| Area | 55.5 | 55.5 | 55.7 | 55.7 | 55.7 | 55.7 | 55.7 |
| Motor vehicle | 411.6 | 360.1 | 433.0 | 441.6 | 437.3 | 445.9 | 475.9 |
| Non-road | 364.1 | 364.1 | 373.1 | 373.1 | 373.1 | 373.1 | 373.1 |
| Low-level point | 9.3 | 9.3 | 9.4 | 9.4 | 9.4 | 9.4 | 9.4 |
| All low-level | 840.5 | 789.0 | 871.2 | 879.7 | 875.5 | 884.0 | 914.0 |
| Elevated point | 16.2 | 16.2 | 16.3 | 16.3 | 16.3 | 16.3 | 16.3 |
| Total Anthropogenic | 856.7 | 805.1 | 887.5 | 896.0 | 891.8 | 900.3 | 930.3 |
| TOTAL | 856.7 | 805.1 | 887.5 | 896.0 | 891.7 | 900.3 | 930.3 |

**Table A-6c. Comparison of Daily Emissions Totals by Source Category for the 2007 Emission Inventory for the Memphis Area: July 2002 Simulation Period.**

EDZ 2007 Emissions Summary for Memphis EAC Area: July 2002 Episode

| NOX | 070704 | 070705 | 070706 | 070707 | 070708 | 070709 | 070710 |
|---|---|---|---|---|---|---|---|
| Area | 9.7 | 10.3 | 9.9 | 9.7 | 10.3 | 10.3 | 10.3 |
| Motor vehicle | 51.7 | 68.4 | 59.1 | 51.7 | 62.2 | 63.4 | 62.8 |
| Non-road | 81.4 | 93.1 | 81.4 | 81.4 | 93.1 | 93.1 | 93.1 |
| Low-level point | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 |
| Biogenic | 15.7 | 15.8 | 15.7 | 14.3 | 15.0 | 15.7 | 15.5 |
| All low-level | 159.8 | 188.8 | 167.4 | 158.4 | 181.9 | 183.8 | 182.9 |
| Elevated point | 16.7 | 16.9 | 20.4 | 20.4 | 20.6 | 16.9 | 16.9 |
| Total Anthropogenic | 160.8 | 189.9 | 172.1 | 164.4 | 187.4 | 185.0 | 184.4 |
| TOTAL | 176.5 | 205.7 | 187.7 | 178.7 | 202.4 | 200.7 | 199.8 |
| VOC | 070704 | 070705 | 070706 | 070707 | 070708 | 070709 | 070710 |
| Area | 89.8 | 89.8 | 89.8 | 89.8 | 89.8 | 89.8 | 89.8 |
| Motor vehicle | 32.3 | 42.7 | 36.9 | 32.3 | 38.9 | 39.6 | 39.2 |
| Non-road | 32.4 | 22.3 | 32.4 | 32.4 | 22.3 | 22.3 | 22.3 |
| Low-level point | 11.8 | 11.9 | 11.8 | 11.8 | 11.9 | 11.9 | 11.9 |
| Biogenic | 645.7 | 572.6 | 662.8 | 579.4 | 586.9 | 619.4 | 509.2 |
| All low-level | 812.0 | 739.3 | 833.8 | 745.7 | 749.7 | 783.1 | 672.5 |
| Elevated point | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Total Anthropogenic | 168.5 | 169.0 | 173.2 | 168.5 | 165.1 | 165.9 | 165.5 |
| TOTAL | 814.2 | 741.6 | 836.0 | 748.0 | 752.0 | 785.3 | 674.7 |
| CO | 070704 | 070705 | 070706 | 070707 | 070708 | 070709 | 070710 |
| Area | 35.5 | 35.6 | 35.5 | 35.5 | 35.6 | 35.6 | 35.6 |
| Motor vehicle | 315.6 | 417.0 | 360.6 | 315.6 | 379.4 | 386.9 | 383.2 |
| Non-road | 360.3 | 369.2 | 360.3 | 360.3 | 369.2 | 369.2 | 369.2 |
| Low-level point | 9.3 | 9.3 | 9.3 | 9.3 | 9.3 | 9.3 | 9.3 |
| All low-level | 720.6 | 831.1 | 765.7 | 720.6 | 793.5 | 801.0 | 797.2 |
| Elevated point | 10.4 | 10.6 | 10.4 | 10.4 | 10.6 | 10.6 | 10.6 |
| Total Anthropogenic | 731.0 | 841.6 | 776.2 | 731.0 | 804.1 | 811.6 | 807.8 |
| TOTAL | 731.0 | 841.6 | 776.2 | 731.0 | 804.0 | 811.6 | 807.8 |

**Table A-6c.** *(continued)*

EAC 2007 Emissions Summary for Memphis EAC Area: July 2002 Episode

| NOX | 070704 | 070705 | 070706 | 070707 | 070708 | 070709 | 070710 |
|---|---|---|---|---|---|---|---|
| Area | 12.3 | 13.2 | 12.6 | 12.3 | 13.2 | 13.2 | 13.2 |
| Motor vehicle | 55.2 | 73.0 | 63.1 | 55.2 | 66.4 | 67.7 | 67.1 |
| Non-road | 76.8 | 88.6 | 76.8 | 76.8 | 88.6 | 88.6 | 88.6 |
| Low-level point | 1.9 | 2.0 | 2.0 | 1.9 | 2.0 | 2.0 | 2.0 |
| Biogenic | 15.7 | 15.8 | 15.7 | 14.3 | 15.0 | 15.7 | 15.5 |
| All low-level | 161.9 | 192.5 | 170.1 | 160.5 | 185.2 | 187.2 | 186.3 |
| Elevated point | 27.4 | 27.6 | 32.5 | 32.5 | 32.7 | 27.6 | 27.6 |
| Total Anthropogenic | 173.6 | 204.3 | 186.9 | 178.7 | 202.8 | 199.1 | 198.4 |
| TOTAL | 189.3 | 220.1 | 202.6 | 193.0 | 217.8 | 214.8 | 213.9 |
| VOC | 070704 | 070705 | 070706 | 070707 | 070708 | 070709 | 070710 |
| Area | 133.3 | 133.3 | 133.3 | 133.3 | 133.3 | 133.3 | 133.3 |
| Motor vehicle | 32.8 | 43.4 | 37.5 | 32.8 | 39.5 | 40.2 | 39.8 |
| Non-road | 31.8 | 21.7 | 31.8 | 31.8 | 21.7 | 21.7 | 21.7 |
| Low-level point | 8.6 | 10.9 | 8.7 | 8.6 | 10.9 | 10.9 | 10.9 |
| Biogenic | 645.7 | 572.6 | 662.8 | 579.4 | 586.9 | 619.4 | 509.2 |
| All low-level | 852.2 | 781.9 | 874.1 | 785.9 | 792.3 | 825.6 | 715.0 |
| Elevated point | 4.1 | 4.3 | 4.1 | 4.1 | 4.3 | 4.3 | 4.3 |
| Total Anthropogenic | 210.6 | 213.6 | 215.4 | 210.6 | 209.7 | 210.5 | 210.1 |
| TOTAL | 856.3 | 786.2 | 878.2 | 790.0 | 796.6 | 829.9 | 719.3 |
| CO | 070704 | 070705 | 070706 | 070707 | 070708 | 070709 | 070710 |
| Area | 55.5 | 55.7 | 55.5 | 55.5 | 55.7 | 55.7 | 55.7 |
| Motor vehicle | 360.4 | 476.3 | 411.9 | 360.4 | 433.4 | 441.9 | 437.7 |
| Non-road | 355.9 | 364.9 | 355.9 | 355.9 | 364.9 | 364.9 | 364.9 |
| Low-level point | 9.3 | 9.4 | 9.3 | 9.3 | 9.4 | 9.4 | 9.4 |
| All low-level | 781.1 | 906.2 | 832.7 | 781.1 | 863.3 | 871.9 | 867.6 |
| Elevated point | 16.2 | 16.3 | 16.2 | 16.2 | 16.3 | 16.3 | 16.3 |
| Total Anthropogenic | 797.2 | 922.5 | 848.8 | 797.2 | 879.6 | 888.2 | 883.9 |
| TOTAL | 797.2 | 922.5 | 848.8 | 797.2 | 879.6 | 888.2 | 883.9 |